

SEASON EFFECTS ON CATTLE DIET QUALITY

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INTRODUCTION

Cattle grazing native rangelands in eastern Oregon are limited by nutritional inadequacies during much of the year. The length of time when forage quality is adequate for livestock is limited in part because annual precipitation is low, and summer drought is typical. Livestock producers, and others concerned with maintaining adequate livestock performance on native rangeland need to know what seasonal variation in diet quality to expect. Such knowledge will permit them to devise management plans which minimize nutritional deficiencies, and enhance animal performance with proper supplementation. Previous work at this location (Raleigh and Wallace, 1964) has demonstrated that supplementation of yearling cattle during summer can provide increased profits. Further information is needed on fall and winter diet quality because of increasing interest in dormant season grazing.

This research was initiated in March 1986, and continued through February 1989. Objectives were to develop a nutritional profile for cattle, and to determine expected extremes of diet quality from the peak in spring to the minimum in fall or winter. Diet samples were collected from esophageally fistulated steers every other week for the three years of the study. At each collection period, three to five steers were released to graze for 30 minutes in pastures occupied by the main cow herd. Samples of ingested forage were collected in screen-bottomed bags. Samples were stirred, subsampled, and placed in plastic bags. Later samples were dried, ground, and analyzed for percentages of crude protein, cell walls, and organic matter digestibility. Precipitation was measured at the weather station located at headquarters.

RESULTS

Monthly precipitation was highly variable during the study, which is typical for this region (Figure 1). Winter and spring precipitation determines the amount of forage growth expected during the growing season, and also affects the length of the growing season. In each of the three years, winter and spring precipitation was adequate to provide good spring growth. However, summer and fall precipitation was highly variable among years, with no measurable rain in September 1987, July 1988, and October 1988. As will be seen later, August and September precipitation has significant impact on forage quality in fall.

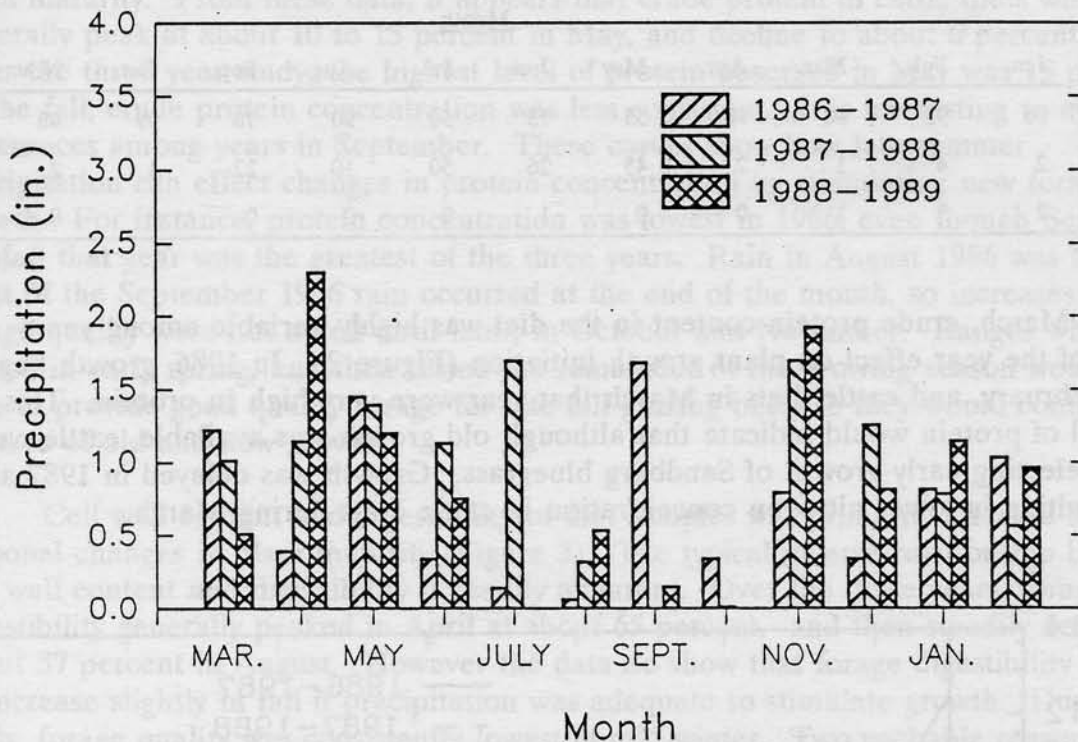


Figure 1. Precipitation received during the three year study at the Squaw Butte Experimental Range.

Diet composition of samples was analyzed for the first year of the study. Cattle diets were dominated by grasses, but forbs became important when available in spring and summer (Table 1). Changes in diet composition demonstrate the ability of livestock to dynamically shift their diets in response to changing forage conditions. Cattle did consume small amounts of sagebrush during winter. Cattle were located on lower elevation pastures dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) during winter. This subspecies is generally considered to be of low palatability, so the low level of consumption of sagebrush is not surprising. Cattle were observed consuming dead sagebrush stems, mainly during high stress periods when snow cover restricted availability of dormant grasses. Seasonally, cattle shifted from Sandberg bluegrass in early spring, to generally equal mixtures of bluegrass, bluebunch wheatgrass, squirreltail, and Thurber needlegrass in May. During summer, Idaho fescue was a major component of cattle diets. At that time cattle were on higher elevation pastures with access to north facing slopes. In fall, cattle were moved to lower pastures dominated by bluebunch wheatgrass. Initially they selected mainly bluebunch wheatgrass but later shifted to Thurber needlegrass in November and December.

Table 1. Composition of diet samples from fistulated steers grazing sagebrush rangeland during 1986-1987.

	Month											
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Grasses	96	93	98	98	55	73	50	90	78	99	98	97
Forbs	2	4	1	2	45	26	50	10	22	1	2	3
Browse	2	3	1	0	0	1	0	0	0	0	0	0

In March, crude protein content in the diet was highly variable among years because of the year effect on plant growth initiation (Figure 2). In 1986, growth began in late February, and cattle diets in March that year were very high in protein. This high level of protein would indicate that although old growth was available, cattle were actively selecting early growth of Sandberg bluegrass. Growth was delayed in 1987 and 1988, resulting in lower nitrogen concentration in cattle diets during March.

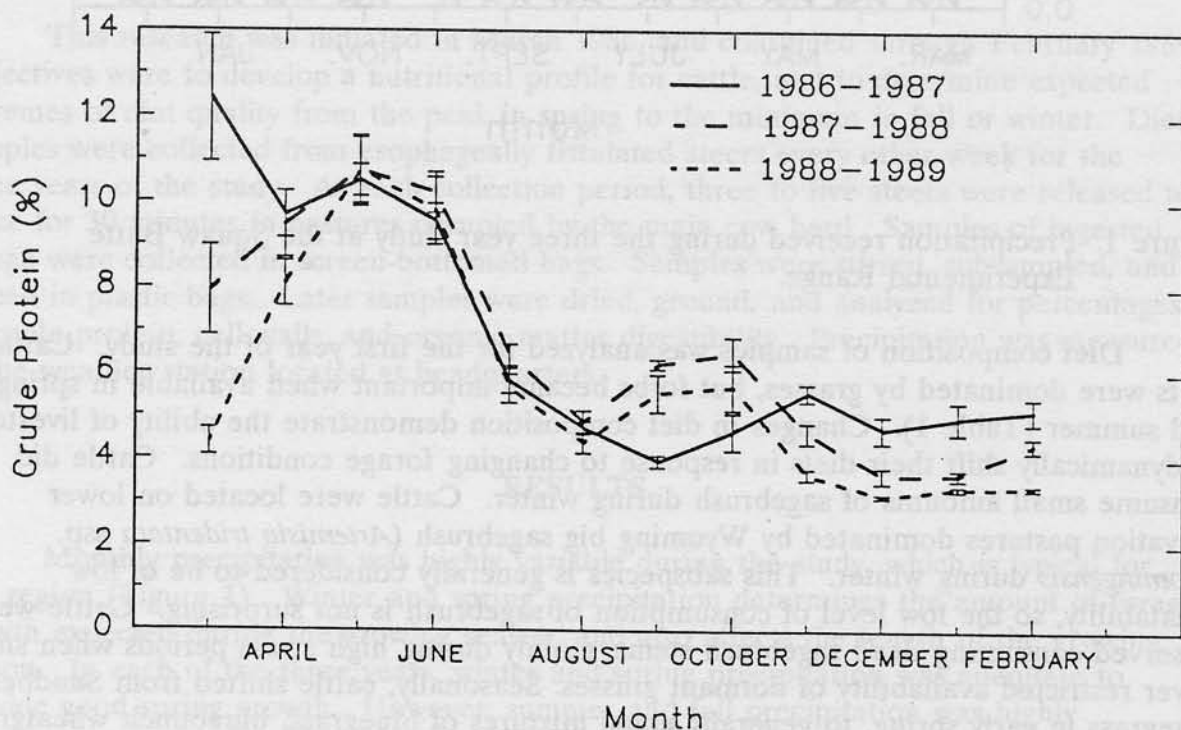


Figure 2. Crude protein content of diet samples obtained from steers grazing sagebrush rangeland. Vertical bars represent 1 standard error of the mean at each date.

100

In all three years, seasonal declines in protein concentration from May to August were very consistent. This pattern reflects the normal decline associated with increasing plant maturity. From these data, it appears that crude protein in cattle diets will generally peak at about 10 to 15 percent in May, and decline to about 6 percent in July. Over the three year study, the highest level of protein observed in May was 15 percent. In the fall, crude protein concentration was less consistent. It is interesting to note the differences among years in September. These curves show how late summer precipitation can effect changes in protein concentration by stimulating new forage growth. For instance, protein concentration was lowest in 1986, even though September rainfall that year was the greatest of the three years. Rain in August 1986 was low, and most of the September 1986 rain occurred at the end of the month, so increases in forage quality were not noted until later, in October and November. Ranges which are grazed in early spring, and then rested the remainder of the growing season would be able to provide good quality forage for late fall grazing because they would contain a mixture of old and new growth.

Cell wall content and digestibility of diet samples was primarily affected by seasonal changes in plant maturity (Figure 3). The typical inverse relationship between cell wall content and digestibility is readily apparent. Over the three years, forage digestibility generally peaked in April at about 65 percent, and then steadily declined to about 57 percent in August. However the data do show that forage digestibility tended to increase slightly in fall if precipitation was adequate to stimulate growth. During this study, forage quality was consistently lowest in mid winter. Two probable reasons for the declines noted in January and February were that cattle had consumed the higher quality forage in November and December, and that weathering had decreased the quality of the remaining dormant forage. Forage digestibility was generally increasing by March, in response to early forage growth.

SUMMARY

Knowledge of the effects of season on forage quality allow a rancher to modify management practices to optimize livestock gain. Pasture rotation, early weaning, supplementation and even time of calving can be modified to make the most of available nutrients and improve the return to stockmen.

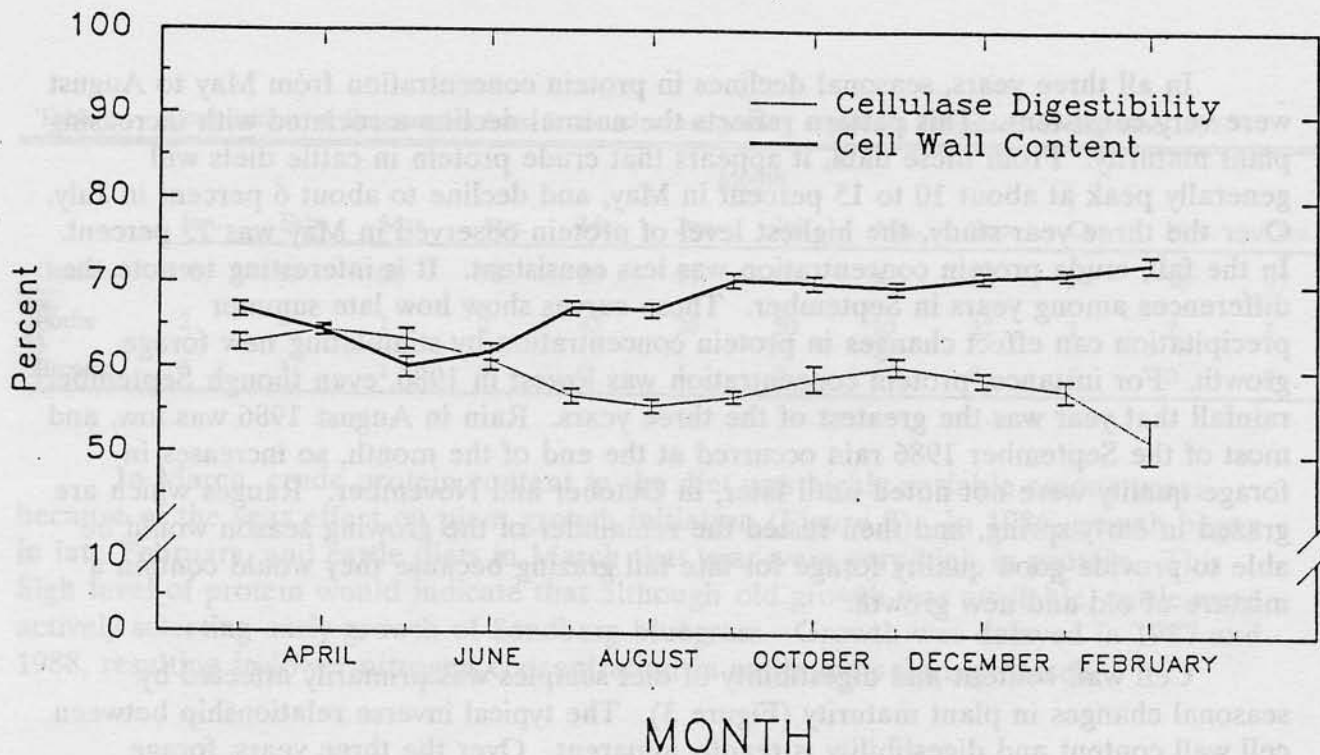


Figure 3. Average cell wall content and organic matter digestibility of diet samples from steers grazing sagebrush rangeland. Vertical bars represent 1 standard error of the mean at each date.

Nutritional status of cattle grazing sagebrush rangeland will decrease quickly in late spring, and by mid summer crude protein content of the diet will generally be below 6 percent. Growing cattle require greater nitrogen concentration than this level in their diet, and other research at this station has demonstrated the benefits of supplemental protein during summer. Summer declines in forage quality appear to be consistent. Fall precipitation, however, can significantly improve diet quality. In this study, we reserved forage produced in spring for use in fall. The results show that this forage, coupled with fall growth, can significantly enhance diet quality in late summer and fall. A program of early weaning, coupled with pasture management designed to improve forage quality in fall could help to maintain condition of cattle going into the winter.

Diet quality in winter was consistently low during this study, with crude protein in winter usually below 5 percent, and digestibility at about 57 percent. January and February are critical months because forage quality is low while environmental stress is high. It is apparent from these results that supplementation will be required if a successful system of winter grazing is to be developed. Grazing in fall and winter is receiving increased interest because it can reduce requirements for harvested hay. Additionally it can provide an alternative to grazing during the growing season, allowing plants to rest and gain vigor. Based on the interest in winter grazing and the results of

this preliminary study, we have initiated another study designed to investigate the response of cattle to protein supplementation during the winter. Results from that study are presented elsewhere in this report.

LITERATURE CITED

Raleigh, R. J. and J. D. Wallace. 1964. Supplementing Yearlings on Native Range. IN: Research in Beef Cattle Nutrition and Management. Oregon State University. Ag. Exp. Station Special Rpt. 171. pp. 4-9.