Table 3. Chemical composition of wheat forage where bloat was not observed and bloat-provocative pastures

Wheat pasture	Bloat not observed	Bloat-provocative pastures
Number of samples	9	7
Dry matter (DM), %	28.48	22.31
Total fiber		
(Neutral-detergent fiber)	44.59	35.02*
Crude protein, %	25.40	31.75*
Soluble nitrogen		
% of DM	1.85	3.24**
% of total N	44.94	61.79*
Soluble Protein Nitrogen		
% of DM	0.79	1.30*
% of total N	19.07	24.53
Soluble non-protein nitrogen		
% of DM	1.06	1.94**
% of total N	25.84	37.18**
Soluble carbohydrate, %	13.09	9.27

Significantly different from wheat forage samples taken from pastures where bloat was not observed: *(P<.05); **(P<.01).

frequently seen "chewing their cuds" may be less likely to bloat than those that are not. Also freeze-burned, dormant wheat forage is not likely to cause bloat.

Plant Chemical Composition and Digestibility of Rangeland Forage

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Story in Brief

Forage samples were collected on a monthly basis from various points on a watershed. Both live and standing dead plants were collected. At the various sampling points both caged (C) and grazed (G) vegetation was sampled. Fiber (ADFP), lignin (ADLP) and cellulose (CELLP) data were very similar in both the caged (live and dead) and grazed (live and dead) samples for the months of June, July and August. Fiber data showed CLADFP, CDADFP, GLADFP,

and GDADFP were 37.3, 51.9, 37.5, 51.4 percent for June vs. 47.8, 50.6, 39.0, 51.1 percent for August, respectively. Lignin for CLADLP, CDADLP, GLADLP, and GDADLP was 8.2, 12.8, 12.6, 12.2 percent for June vs. 10.4, 11.1, 10.3, 14.8 percent for August, respectively. Cellulose for CLCELLP, CDCELLP, GLCELLP, and GDCELLP was 30.6, 36.5, 31.2, 36.4 percent for June vs. 30.2, 37.5, 30.0, 37.7 percent for August, respectively.

Invivo digestion data was similar with the forage in June being less digestible than expected for that point in the growing season. Digestibility (DMD) for CLDMD, CDDMD, GLDMD, and GDDMD was 35.9, 18.5, 35.8, 3.1 percent for June vs. 47.8, 22.4, 50.4, 22.0 percent for August.

Introduction

There has been much interest in recent years given to animal waste pollution. Most of the interests are directed at point sources of pollution (e.g., feedlots) or nonpoint sources such as cropland or intensively managed pasture land.

With high grain prices and a greater demand abroad for grain for human consumption, more emphasis in the future will be placed on greater forage utilization in beef production systems. Much of the additional forage will have to come from rangeland, requiring more efficient rangeland forage production. Consequently, there will be a need for greater understanding of range ecosystems.

Recently, larger numbers of cattle have been maintained on rangeland because of the economic plight in the beef cattle industry. If proper management is not practiced, rangelands will be overstocked and overgrazed. Improper stocking rates and overgrazing could lead to greater water pollution from feces produced by livestock grazing rangeland, as a result of increased runoff.

The purpose of this study was to determine the interrelationships between plant chemical composition and animal waste chemical composition. Digestibility relates the effects of quality of forage with plant chemical composition. The data available at this time includes a limited amount of plant chemical composition and digestibility of range forage components.

Materials and Methods

The study area consists of a 28.3 acre watershed located at the northwest end of Lake Carl Blackwell in Noble County, Oklahoma. Forage samples were collected on a monthly basis from various points on the watershed. Three small (0.2 acres each) cattle enclosures were constructed along the upper edge of the watershed ridgeline to serve as a control. Both live and standing dead plants were collected. At the sampling points both caged and grazed vegetation was sampled. Grazing utilization, species composition, and forage production were determined on both caged and grazed sampling points. On grazed sampling points, cover, ground litter, and surface soil temperature were determined.

Three Holstein steers (898 pounds) were fitted with rumen cannulae on May 5 for the purpose of running nylon bag *in vivo* digestion trials. The steers were put on four acres of native range pasture on May 20. The grasses were of the same species as those on the watershed. Samples were run on a monthly basis to correspond with the collection period of the forage. *In vivo* nylon bag dry matter disappearance was determined for 48 hour incubation periods.

Results and Discussion

Chemical composition data are shown in Tables 1, 2, and 3. Fiber content as shown in Table 1 are very similar during each of the three months. Caged data was unavailable at this time for the month of July. Caged and grazed live samples were almost identical in June, but showed some difference in August. Caged and grazed dead forage did not show any difference. As shown in Table 2, lignin content during the month of June was 8.2 percent CLADLP vs. 12.6

Table 1. Chemical composition of caged live and dead vs. grazed live and dead forage acid detergent fiber content

Materials	June %	July %	August %
CLADFP	37.3		47.8
CDADFP	51.9		50.6
CLADFP	37.5	39.0	39.0
GDADFP	51.4	53.2	51.1

Table 2. Chemical and composition of caged live and dead forage acid detergent lignin content

Materials	June %	July %	August %
CLADLP	8.2		10.4
CDADLP	12.8		11.1
GLADLP	12.6	9.4	10.3
GDADLP	12.2	14.4	14.8

Table 3. Chemical composition of caged live live and dead vs. grazed live and dead forage cellulose content

Material	June %	July %	August %
CLCELLP	30.6		30.2
CDCELLP	36.5		37.5
GLCELLP	31.2	31.6	30.0
GDCELLP	36.4	38.0	37.7

Table 4. ***In vivo*** **dry matter disappearance of caged live and dead vs. grazed live and dead forage**

Materials	June %	July %	August %
CLDMD	35.9		47.8
CDDMD	18.5		22.4
GLDMD	35.8	43.8	50.4
GDDMD	3.1	7.3	22.0

percent GLADLP. A possible explanation for this slight increase in the caged over the grazed sample values could be species composition within the sample. If the sample of grazed forage consisted of more fibrous-type plant material this increase in lignin content could be justified. The August composition was almost identical in lignin content. The caged and grazed dead forage for August also followed somewhat the same patterns as the June caged and grazed live forage samples. Cellulose data as presented in Table 3 shows that there was very little difference in chemical composition during the two months of June and August.

Digestibility data as shown in Table 4 indicates a slow start in the spring for the growing season. One would expect the forage DMD for both the caged and grazed live forage to be much higher than 35.9 vs. 35.8 percent, respectively, during June. The values for August are somewhat higher than those for June, but very similar to each other. The caged and grazed dead DMD values are almost identical for the month of August.

The data presented here do not show any striking differences between those forages collected in late spring and late summer. This could be due in part to a lack of rainfall in the early spring to stimulate the regrowth of the forages. Consequently, some adapted perennial plants may have gone into dormancy in the dry season pulling nutrient reserves into the roots and leaving the aerial part with a low nutritive value. Temperature increases metabolic activity, and plants tend to accumulate cell wall structures containing lignin and cellulosic carbohydrates. It has been shown that increasing temperature promotes a lowering of nutritive value at the same physiological age in grasses. The above reasons of temperature and rainfall could possibly explain the reason why the chemical composition of the forage at different stages of the growing season are so similar in nature.