Nutrient Content of Forage Ingested in the Morning Compared to Evening

MERWYN M. KOTHMANN[1]

Research Assistant, Department of Range Management, Utah State University, Logan.

Highlight

Forage samples were collected from esophageal fistulated sheep in morning and evening. There was significantly more total protein and gross energy in the diet in the evening than in the morning.

Van Dyne and Torell (1964) presented a review of the use of esophageal fistulated animals for sampling range forage. Van Dyne et al. (1964) reported no significant differences in the ether extract, crude protein, cellulose, lignin, and chromogen content between morning and evening diets of sheep on Montana ranges. However, on California annual ranges, sheep diets tended to have more crude protein in the morning than in the evening, but the difference was small (Van Dyne and Heady, 1965a). The botanical composition of diets in the morning and late afternoon differed in another study, and the afternoon diets appeared to be more selected than were the morning diets (Van Dyne and Heady, 1965b). The present study was conducted to compare the chemical content of forage collected from esophageal fistulated sheep grazing in the morning compared with sheep grazing the same area in the evening.

Methods

Fourteen typical sagebrush-grass areas of 2 to 5 acres each were selected in the mountains of northern Utah. Each area was grazed for 2 consecutive 5-day periods. The first period was considered light use and the second period moderate use of the herbage. The first area was grazed in early June and the fourteenth in early September. Four sheep equipped with esophageal fistula cannula were grazed on each area. In the evening after the sheep ceased grazing, two of them were penned. Early the next morning they were equipped with collection bags and allowed to graze for one to two hours. After the collection bags were removed these sheep were allowed to graze for their own maintenance the rest of the day. About mid-morning all of the sheep would quit grazing and bed-down for several hours because of the heat. When they stopped grazing, the two remaining fistulated sheep were penned. When the sheep began grazing in the evening around 4 or 5 PM, a collection was made from these fistulated animals.

At the end of each 5-day period the samples were composited for each sheep. They were then ground through a Wiley mill, and chemically analyzed for ether extract, total protein, ash, lignin, cellulose, "other carbohydrates" (by difference), and gross energy.

An analysis of variance was run

[1] *Present address: Research Assistant, Department of Range Science, Texas A&M University, College Station.*

on the data. Study areas, grazing intensity, and collection time were considered fixed effects and animals were considered random effects. The same sheep were used throughout the summer.

Results

Significant differences were found in the nutrient content of samples collected in the morning compared to those collected in the evening, but the relative magnitude of these differences was not large (Table 1). Total protein was significantly higher ($P < .05$) in the evening than in the morning, and gross energy was also significantly higher ($P < .01$) in the evening than in the morning.

Table 1. Average chemical content of esophageal fistulae samples from sheep on mountain range collected in the morning and evening at two intensities of grazing.[1]

Time	Degree of use	Ether extract	Total protein	Ash	Lignin	Cellulose	Other carbohydrates	Gross energy Kcal/g
		— — — — — — — — — Percent — — — — — — —						
AM	Light	3.6	12.4	12.0	14.5	19.0	38.5	4.29
	Moderate	3.5	11.8	12.1	15.2	20.2	37.2	4.28
	Average	3.5	12.1*	12.0	14.9	19.6	37.8	4.28**
PM	Light	3.6	13.0	11.5	14.3	19.3	38.4	4.34
	Moderate	3.7	12.4	12.1	15.8	19.8	36.6	4.32
	Average	3.6	12.7*	11.8	15.0	19.5	37.5	4.33**

[1] Averages are from 2 fistulated sheep in the morning and 2 in the evening from a total of 14 areas.
* Significantly different at the .05 level of probability.
** Significantly different at the .01 level of probability.

The differences in the chemical content of the diet consumed in the morning compared to that consumed in the evening could be attributed to several things. The sheep might select different parts of the plants or different species of plants. The chemical content of the plants may fluctuate between morning and evening. The observed differences probably are a result of a combination of these factors.

LITERATURE CITED

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