

**HERBIVORE PREFERENCE FOR AFTERNOON- AND MORNING-CUT FORAGES
AND ADOPTION OF CUTTING MANAGEMENT STRATEGIES**

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Abstract

Photosynthesizing forage plants accumulate total nonstructural carbohydrates (TNC) during daylight, but then TNC concentrations are reduced during the night. Afternoon-cut forage (PM) has greater TNC value and thus economic value, than morning-cut (AM). Livestock prefer PM-cut hay and this can be readily demonstrated by offering animals a choice of hays cut in PM and AM. Alfalfa growers in the western United States are readily adopting PM-cutting technology to increase profits.

Keywords: Cattle, sheep, goats, horses, alfalfa, diurnal quality changes, animal eating preference

Introduction

During the day, photosynthesizing plants accumulate TNCs at a faster rate than are metabolized to less soluble compounds, respired, or transported out of the foliage (Plhak 1989). In darkness, foliage TNC concentrations decline.

Cattle, sheep, and goats prefer tall fescue (*Festuca arundinacea* Shreb.) and alfalfa (*Medicago sativa* L.) hay that is cut in the late afternoon (PM) to that cut the next morning (AM) (Fisher et al. 1998, 1999). Animals will also eat more of the PM-cut than AM-cut hay. Kim (1995) reported that dairy cows receiving PM-cut alfalfa, as part of the total mixed ration, produced about 8% more milk during a ten week period than did cows eating the same ration containing AM-cut alfalfa. The increased dry matter intake is likely stimulated by the greater concentration of TNC in the PM-cut forage (Fisher et al. 1999). A Relative feed value[@], an index reflecting alfalfa hay quality, may be elevated 10 to 15% in PM-cut hay and possibly qualifying it as premium hay.

We report the growing acceptance of PM-cutting technology in the western United States and describe a simple on-farm demonstration to show animal preferences between PM- and AM-cut hays.

Material and Methods

During 1998, information about benefits of cutting forage in afternoon began appearing in agricultural news media in western United States. In December 1999, 50 growers attending the 1999 California Alfalfa Growers Symposium were asked if they were aware of the benefits of PM-cut forage, did they cut their 1999 crop in afternoon, and were they planning to cut their 2000 cropped alfalfa in the afternoon? This survey was repeated in Idaho with an additional 72 growers responding

to the same survey questions.

A simple demonstration was designed to test animal preference for PM-cut forage. Alfalfa hay grown under a center pivot irrigation system near Bozeman, MT, was cut in late afternoon (PM) or early morning (AM) during 1999 and packaged as round bales. During the subsequent winter, 40 yearling Hereford heifers were fed PM- and AM-cut hay placed in separate round-bale feeders. After animals consumed both hays, each feeder was replenished. This was continued through three complete cycles with the heifers and was similarly repeated with six stock horses in another pasture. Hay consumption was estimated and photos were taken.

Results and Discussion

Alfalfa growers were quick to adopt the afternoon cutting practice (Table 1). In the California survey, 59% of the 1999 alfalfa crop was cut in afternoon. Growers projected that 90% would be cut in afternoon during 2000 while the remaining were considering afternoon cutting. Most of this hay is grown in an arid to semiarid climate with little or no morning dew. The Idaho surveys indicated that during 2000 most growers projected cutting their alfalfa in the afternoon.

The farm demonstration of animal preference between AM- and PM-cut hays successfully illustrated the value of PM- versus AM-cutting of forage. Cattle and horses preferred the PM-cut hay and ate most of it before eating the AM-cut hay. Forage and livestock producers readily monitored Hay consumption as they drove past the areas where PM- and AM-cut hay was being offered to the livestock. The study was easily conducted, using readily available equipment and livestock. Drive-by producers could see the results and were anxious to tell others.

In conclusion, forage producers are able to maximize forage quality by centering their cutting window on one hour before sundown (Shewmaker et al. 1999). Livestock can detect even small differences in TNC and likely prefer the PM- to AM-cut because of greater soluble sugar concentration in the PM-cut forage. Most importantly, there is an increased milk production by dairy cows eating rations containing PM-cut forage. Alfalfa growers and dairymen are rapidly adopting this technology.

References

Fisher, D.S., Mayland H.F. and Burns J.C. (1999). Variation in ruminant's preference for tall fescue hays cut either at sundown or at sunup. *J. Anim. Sci.* **77**:762-768.

Fisher, D.S., Mayland H.F. and Burns J.C. (1998). Ruminant preference for alfalfa hay harvested in the afternoon. *Agron. Abstr.* p. 149, also *J. Dairy Sci.* **81**:suppl. #1. p. 194.

Kim, D. (1995). Effect of plant maturity, cutting, growth stage, and harvesting time on forage quality. Ph.D. dissertation. Utah State Univ., Logan.

Plhak, F. (1989). Differences in nutritive value of lucerne cut in morning and afternoon hours. XVI International Grassland Congress, Nice, France, p. 817-818.

Shewmaker, G.E. and Mayland H.F. (1999). Daily changes in alfalfa forage quality. In: Proceedings, 29th California Alfalfa Symposium, 8-9 December 1999, Fresno, CA, UC Cooperative Extension, University of California, Davis. p. 68-73.

Table 1 - Adoption of afternoon cutting practice during 1999 and projected in 2000. Results of surveys conducted at meetings in December 1999 through February 2000.

Group	Number of Growers	Mean Hectares	Proportion of Alfalfa Cut in Afternoon		
			1999	Projected in 2000	
		ha	%	Yes	Maybe
California Alfalfa Growers	50	646	59	90	9
Idaho Hay Growers	15	281	88	81	19
Preston, ID	30 ^H	93	80	75	7
Rexburg, ID	27 ^I	204	82	92	2

^H Includes 12 who were primarily feeders.

^I Includes 3 who were primarily feeders.