THE YIELD AND SUGAR CONTENT OF ALFALFA CUT AT VARIOUS TIMES OF DAY AND THE SUGAR CONTENT OF THE HAY AFTER VARIOUS METHODS OF DRYING

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Curtis (1) recently reported that cuttings of alfalfa made in the afternoon contained approximately 19% more dry matter and 83% more sugar on an acre basis than if cut the morning before or the morning after. That the content of sugars in plants varies considerably from day to day or from hour to hour has been well recognized. Thus, Wilson and Webb (6) reported findings which indicated that the sugars in alfalfa on July 1, 1935, were highest at 4:40 a.m. and 6:40 a.m. Swedish workers (4) agreed with Curtis that hays were frequently somewhat higher in sugars in the afternoon than in the morning, but that the content of sugars was influenced considerably by cloudy or rainy weather.

That the total dry matter in almost mature stems of alfalfa usually decreases 19% overnight, or increases 19% during any one day, seems somewhat improbable in view of the results of extensive studies of the field weights of alfalfa. In making the ordinary routine harvests of large blocks of alfalfa plots, suitably replicated, when harvest has continued all of one day and part of the next, no such diurnal changes in yield have been observed.

In 1944, however, in order to examine these important claims more thoroughly, parallel routine harvests were made, night and morning, on certain plots. For a 3-day period in addition, harvests were made three times a day on a large area devoted exclusively to this study. These fields yielded approximately 5,000 pounds of dry matter per acre, and were excellent stands of pure alfalfa. Samples were taken for drying in four ways, namely (a) prompt drying for chemical analysis in a blast of air heated to about 65° C; (b) slower drying about 3 days of 50-pound samples in circulated unheated air; (c) still slower drying (about 3 weeks) in a mop-drier of about 15 tons of hay; and (d) field drying. From these lots of hay, samples were taken for chemical analysis to determine the original content of sugars and starch and their retention during the drying process.

During the entire period of the experiment, the weather remained clear and warm with few clouds. Data from the local U. S. Weather Station show that on each day, the wind velocity was approximately 15 miles per hour, the relative humidity from 40 to 60, and there was little if any dew. On June 28, the "possible sunshine" was 98%; on June 29, 92%; and on June 30, 94%. Maximum-minimum temperatures for the three days were: June 28, 94° and 72°; June 29, 78° and 60°; June 30, 73° and 49°. Heavy rains the previous week had supplied abundant moisture for growth. Curtis (2) states in comment on notes by Woodward, et al., and Willard (5, 7) that his "average

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3 Figures in parenthesis refer to "Literature Cited", p. 399.