THE FOOD CONTENT OF FORAGE CROPS AS INFLUENCED BY THE TIME OF DAY AT WHICH THEY ARE CUT

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DURING the growing period the digestible food content, the total dry matter and the relative composition of the various constituents of the tops of forage crops will show a change from morning to afternoon and from afternoon to the next morning. It is obvious that such changes will almost inevitably occur because the manufacture of carbohydrate from the raw materials, carbon dioxide and water, occurs only while the plant is exposed to light, therefore any gain in total food content will occur only while exposed to light. There must be some loss from the plant as a whole during darkness because of respiration. The loss of digestible food content from the shoots at night results partly from this respiration, partly from utilization in growing parts of the shoot, and partly from transport to roots or other underground portions. The amount of gain during the day will be greatly influenced by several factors, especially the light conditions, and the amount of loss and transformation at night will be especially influenced by the temperature, though also by other factors influencing respiration and growth.

If the magnitude of these diurnal changes is great, it is obvious that farmers should be acquainted with the facts so that, where possible, they may adjust their practices to take best advantage of the changes in order to insure a maximum food value of the harvested crop. If diurnal variations are large these may also significantly influence the findings and interpretations of investigations dealing with yield and composition of the vegetative parts of plants.

Many investigations have been carried out with several forage crops to determine the influence of the stage of development on the food value and total yield, that is the progressive changes from day to day or week to week as the plants are developing from young stages to maturity. Although no thorough search of the literature has been made, the writer has seen no report dealing with the diurnal changes occurring in the shoots of forage crops. Miller (6, 7) and Eisele (3) have studied the diurnal changes in carbohydrate and dry matter contents of corn (Miller also worked with sorghum), but they measured changes in leaf blade only and used the leaf-punch method for determining changes per unit area. Since there are diurnal changes in the area of leaf blades which result from changes in water content, differences in actual composition of the leaves based on the use of a punch of constant area may be due either to changes in area or in

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1Contribution from the Laboratory of Plant Physiology, Cornell University, Ithaca, N. Y. Received for publication November 6, 1943.
2Professor of Botany. Funds for carrying out a part of this work were generously supplied by Professor Richard Bradfield of the Department of Agronomy. The four sets of June harvests as well as their analyses were carried out by Palmer J. Waslien while the author was absent on leave. Several other individuals have been of great assistance in harvesting plots and making the detailed analyses.
3Figures in parenthesis refer to "Literature Cited", p. 416.