The Moisture Content of Various Hays in Equilibrium with Atmospheres at Various Relative Humidities

S. T. Dexter

It is well recognized that some of our hays are difficult to cure. In some cases this is due to the weather conditions at the time of year at which they must ordinarily be cut, as in the case of soybean hay. Or the hay itself may have thick, succulent stems that dry out very slowly, as in the case of sweetclover.

For a good many years, the author has been working with hays cut at rather immature stages. Here another difficulty is sometimes encountered. These hays are so low in fibre that the stems lack stiffness and the hay packs down badly, either in the windrow, cock, or mow. In experiments 10 years ago, it was found impossible to cure such hays in ordinary cocks, or in any way where much pressure on the hay developed. Furthermore, immature hays that were almost dry in the evening often appeared to be much damper the next morning than would have been expected with mature hays. In one experiment very young oat hay was harvested. Late in the afternoon it was almost dry so was put in large cocks since the weather was threatening. No rain fell, although the relative humidity was high. The next morning moisture determinations on this hay showed that it was far too wet to be hauled. Part of it was spread out in the driveway of a barn, and frequently turned. Each night it appeared to become wet and finally it became musty and was thrown out. Other similar experiences with immature hay prompted the present experiments in which the moisture equilibria of hays at various relative humidities were measured.

A convenient way to obtain various relative humidities in a closed container is with the use of solutions of sulfuric acid of various concentrations. Directions for making such solutions may be obtained from the International Critical Tables. These solutions were placed in glass jars in which perforated cans were hung. The samples of hays were placed in the cans, where, in a period of a week or 10 days, they come to constant weight. If large samples of hay are used, it is necessary occasionally to correct the concentration of the solution by adding water. For ordinary purposes it is more convenient, and probably more accurate, to use samples small in proportion to the volume of the solution used. In such a case, several samples can be run at one time, and the solution can be used for some time before the water withdrawn or added is sufficient to become significant.

In the case of the samples described in this paper, the hays were air-dry when placed in the relative humidity chambers. The percentage of moisture was determined by loss of weight in an oven at 103°C. The content of moisture at equilibrium is shown in Table 1. Dexter, et al.

1Contribution from the Farm Crops Department, Michigan State College, East Lansing, Mich. Journal Article No. 874 (N.S.) Michigan State College Experiment Station. Also presented at the annual meeting of the Society held in Omaha, Neb., November 19, 1946. Received for Publication April 11, 1947.

2Associate Professor.