SILAGES are mixtures of dry matter, water, and air in widely varying proportions. The proportions are highly significant in the storage and fermentation characteristics of the product. In view of these facts, the following experiments were performed to obtain data relating to the density of the dry matter and of the chopped green material. The volume of intercellular gas and of gas per cubic foot of silage of various densities was measured, and was related to the ease of movement of gas within the silages of different densities and percentages of dry matter.

METHODS

Experiment 1. Green alfalfa (27.5% dry matter) was chopped into pieces about 1/2 inch long. Dry matter content was determined in a circulating air oven at 102° C. About 40 grams of this green material was placed in each of 5 wide-necked 220-cc. volumetric flasks. Water was added and the flasks and contents were heated at 100° C. for several hours, cooled and reheated, with occasional stirring, until no further air bubbles were expelled from the tissue. The flasks were then placed at 20° C. (the temperature at which the flasks were calibrated for volume) and finally made up to volume with water at 20° C. Weights were taken of the empty flasks, the flasks plus chopped alfalfa, and finally with water added to 220-cc. mark. From these values the density of the dry matter in the silage was computed.

Experiment 2. Green, but somewhat wilted alfalfa, 33% dry matter, was similarly chopped and placed in flasks, in amounts approximating 30 grams. Water at 20° was added, and the material gently agitated with a stirring rod to remove all external air bubbles. Water was added to volume. Weights were taken as before. By use of the value for density of dry matter in alfalfa, the volume of the intercellular gas in the silage was computed per cubic centimeter of tissue.

Experiment 3. Two lots of silage were made from alfalfa at 27.2% and 48% dry matter. Each lot was packed uniformly in a miniature cylindrical silo 1/3 square foot in cross section and about 30 inches tall. Pressure at 5 psi at first and finally at 10 psi was applied by the use of rubber bladders attached to an air supply at those pressures. Rates of 'settling' and final densities were determined in terms of damp silage per cubic foot and dry matter per cubic foot. From these values, the proportion of the volume not occupied by air was computed. Three replicate silos were used in each case.

Experiment 4. Two of the 6 pressurized silos were filled with alfalfa chopped to a length of about 1/2 inch, 2 at 3/4 inch, and 2 at 1 1/2 inches. In one of each pair of silos, the air was replaced, after filling, with 20 grams of petroleum gas (LPG) from a "Prepo" gas cylinder. (Weight of this gas was about 2.12 grams per liter.) Rates of settling under 5 and 10 pounds pressure, final weights per cubic foot, and quality were determined.