NOTE

IMPROVING THE PROTEIN CONTENT OF TIMOTHY (PHLEUM PRATENSE) BY APPLICATION OF SOLUBLE NITROGEN FERTILIZERS 10 TO 20 DAYS BEFORE HARVEST

The improvement of protein content in harvested forage, particularly hay, is an important problem in the humid areas of the United States. Feeds of higher protein content than mature grasses normally contain are greatly desired in feeding dairy cattle, young stock of all types, and to a lesser extent for fattening livestock. At least two approaches may be made, viz., either legumes may be found or developed which are well adapted to local soils and climatic conditions, or some means may be devised for raising the protein content of grasses and other nonlegumes.

Although the improvement of legumes by modern methods is receiving the earnest attention of plant breeders in many states, it is clear that several years must elapse before satisfactory species and strains of legumes will be available generally. At present, the grasses make up a major portion of the hay crop in humid regions. It has been known for many years that higher protein content of grasses could be achieved by early harvest of the crop. Unfortunately, such improved quality of feed necessitates reduced yields of total dry matter to the extent of 30 to 50%. In other words, the total protein per acre increases but little between the early heading and early seed stages of growth; consequently, the percentage of protein in the plant decreases steadily as the yield of dry matter increases.

Efforts to improve the quality of grass hay by use of nitrogen fertilizers in winter or spring usually produce very substantial yield increases and increases in total protein per acre, but only minor increases in percentage of protein when the crop is harvested after the blooming period. Additional nitrogen is largely used by the plant for increased growth, and the protein percentage is maintained at or near the normal range for the species.

In 1930, a theory was devised which assumed that soluble nitrogen fertilizers applied 10 to 20 days prior to harvest of the crop would be absorbed by grass plants and converted into organic forms suitable for animal nutrition. Ten to 20 days, it was believed, would permit ample time for assimilation of soluble nitrogen, and prompt harvest would take advantage of the temporarily increased protein content before the plant could mobilize the nutrient for increased growth. Preliminary tests with nitrate of soda and sulfate of ammonia broadcast on timothy at the heading stage at the rate of 33 pounds of nitrogen per acre increased the total nitrogen content 1.05% to 2.1% when harvest occurred 12 days after treatment. The treated plants showed only 0.2% of nitrogen present in the inorganic form.

A similar experiment was performed in 1931 with two different strains of timothy grown on light sandy loam soil. Thirty-three pounds of nitrogen as sulfate of ammonia applied on June 13 increased the crude protein (N x 6.25) at harvest 21 days later from 6.1% to 9.4%. An equivalent amount of nitrate of soda increased the protein