THE RELATION BETWEEN TOTAL CALCIUM AND PHOSPHORUS IN MATURE PRAIRIE GRASS AND AVAILABLE PLANT FOOD IN THE SOIL

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Information concerning those factors which affect the mineral composition of forage is important since the growth of animals may be retarded when fed on hay or allowed to graze on grasses which are deficient in certain elements, particularly phosphorus and calcium. Studies on the mineral deficiency in pasture plants have been conducted by various investigators (1, 2, 7, 8, 11), and they have found that the total calcium and phosphorus content of plants was slightly correlated with the available minerals in the soil. Studies on the composition of cultivated crops produced on soils varying in available plant food content have been made by Holtz (9), Hartwell (6), Shedd (12), and others, and they also have found that the available minerals in the soil were correlated with the calcium and phosphorus content of the crops which were grown. Blair and Prince (3) state that the phosphorus content of the soil had little or no influence on the composition of soybeans, since one soil containing 0.1% P₂O₅ produced plants with about the same phosphorus content as another soil which contained eight times as much total phosphorus.

More than one-half of the total acreage of hay and the major portion of the pastures in central and eastern Oklahoma are composed of Andropogon furcatus or scoparius. Many of the soils on which these grasses grow are also low in available phosphorus and frequently are medium to strongly acid, consequently a study of the mineral composition of grasses and the available plant food in the soil on which they are found is important in order to secure more information in regard to correlation which may exist between the ash analysis of the plant and mineral deficiencies in the soil.

EXPERIMENTAL PROCEDURE

Composite samples of mature blue stem grasses (Andropogon furcatus and scoparius) were collected each fall from 1929 to 1933, inclusive, from typical areas of pasture land, from hay meadows, and from virgin soils in 37 counties in Oklahoma. During this period 66 samples of grass were collected. A sample of surface soil was secured from each area where grass samples were harvested. Sixty-two samples of soil were collected for analysis. In a few instances samples of big and little blue stem grass were secured from the same area of land and this will explain why there were four more samples of grass than soil.

The plants were dried at 105° C to remove moisture and were analyzed for total calcium and phosphorus by official methods recommended by the American Association of Official Agricultural Chemists.

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2 Assistant Agronomist and Professor of Soils, respectively.
3 Figures in parenthesis refer to "Literature Cited," p. 992.