TECHNICAL NOTES

MOISTURE AND PROTEIN IN FORAGE ON LOUISIANA FOREST RANGES

This paper discusses some observed relationships between moisture and crude protein in forage grazed by cattle on longleaf-pine bluestem ranges in central Louisiana. At present, the relationships are chiefly of interest to technicians, but they may form a basis for a quick method of approximating crude protein in range forage. Such a method would be a real aid to livestock owners in deciding the best time to start supplemental feeding and the amount of supplement needed.

The relationships were developed from several hundred forage samples collected on forest range in central Louisiana in connection with various grazing and feeding studies from 1944 to 1949. Collections included samples of important species of grasses, forbs, and browse at various stages of development, and composite samples of cattle diet taken each month under various forest types on burned and unburned ranges. The composite diet samples were mostly grass herbage, but contained up to 15 percent forbs in early summer and 10 percent browse in winter. Samples were weighed both green and air-dry. Chemical analyses of the samples were then made by E. A. Epps, Jr., Chief Chemist; C. C. Moreland; J. L. Farr; and Miss Frances Bonner of the Fertilizer and Feedstuffs Laboratory, Louisiana Agricultural Experiment Station, Baton Rouge, La. Crude protein is here expressed as a percentage of the moisture-free sample. Total moisture and free moisture (green weight less air-dry weight) are expressed in percentages of green weight.

Forage samples that were mature, weathered, and dry were found to be very low in crude protein, while succulent green samples were high in protein. Separate straight-line regression analyses were made of crude protein on total moisture and then on free moisture (Fig. 1) using some 280 samples that were predominantly grass. Crude protein shown in the free-moisture regression is only 3.0 percent at 20 percent free moisture, but rises to nearly 10.0 percent at 70 percent free moisture. The regression is very highly significant statistically. The two factors are highly correlated, having a gross r value of 0.66.

The regression of crude protein on total moisture was similar, and even more significant than that on free moisture. Free moisture is, however, more easily determined than total moisture.

Each of the general regressions in Figure 1 includes two separate groups of samples: (1) those taken in spring, when vegetation was growing rapidly and crude protein values were relatively high; and (2) those taken in summer, fall, and winter, when crude protein values were relatively low. In order to tie these findings into actual grazing conditions, the 99 available values for composite cattle diet samples were segregated into these two groups, and separate regressions were calculated (Fig. 2).

The protein requirements of beef cattle breeding herds have been established at about 8 to 10 percent of the diet (Guilbert, Gerlaugh, and Madsen, 1945). The regression for summer-fall-winter cattle diet in Figure 2 shows that crude protein content falls below 7.5 percent at about 55 percent free moisture. Ordinarily this occurs late in July, but between 1944 and 1949 the actual date varied from May to October. The amount of protein supplement needed at this time would be only about ¼ pound of cottonseed meal per head per day. This amount could be supplied in a salt-meal mixture.

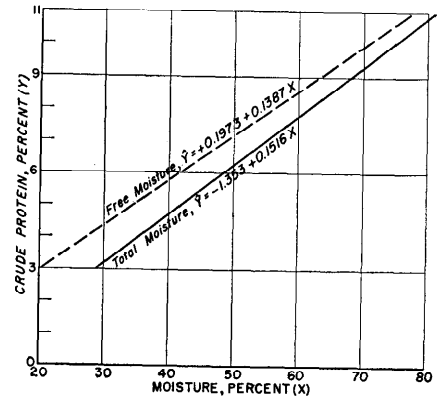

FIGURE 1. Regressions of crude protein on free-moisture and total-moisture percentages for forage on forest range in central Louisiana, 1944–1949.

When the free moisture in range cattle diet falls below about 45 percent, the crude protein content is less than 6.5 percent. This usually occurs in October or early November, but sometimes as soon as August or as late as December. When the range reaches this con-

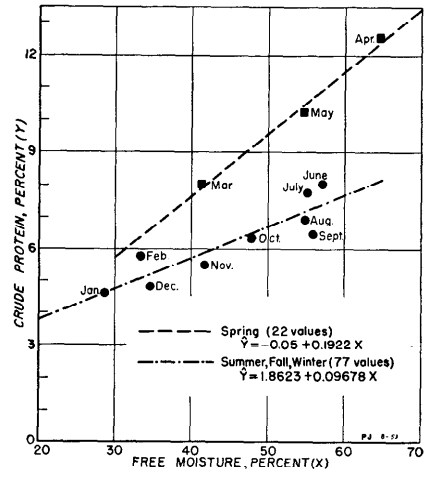

FIGURE 2. Regressions of crude protein on free-moisture percentage for cattle diet samples on forest range in central Louisiana, 1944–49.

dition, the cattle need fresh pasture or about 1 pound of cottonseed meal per head per day. If the cattle continue on range during winter, 1¼ to 1½ pounds of protein supplement probably are needed for the breeding herd, since Morrison's tables (1951) indicate that the crude protein in mature grass is less digestible than that in grass in earlier growth stages.

Figures 1 and 2 do not appear to fit the forage on improved pastures and cannot be applied directly to range forage in the West, but the idea might be helpful in working out moisture-protein relationships for other areas and kinds of forage. A spot check of native grasses at various stages of development under the green roughages listed in Morrison indicates that many species fall within the limits of variability for the regression of total moisture on crude protein shown in Figure 1.

LITERATURE CITED

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