Consumption of Minerals by Cattle on Southeastern Coastal Plain Forest Range

L. K. HALLS and B. L. SOUTHWELL

Range Conservationist, Southeastern Forest Experiment Station and Head, Department of Animal Husbandry, Georgia Coastal Plain Experiment Station, Tifton, Georgia

WHEREVER low quality forage comprises the greater portion of animal diet, supplementary feeding of deficient nutrients becomes an important aspect in livestock management. Such is the case in longleaf-slash pine forests of the lower Coastal Plain or "flatwoods" of Georgia. The so-called native "wiregrass" forage within this region is composed mainly of pineland threeawn, curtiss dropseed, numerous bluestems, panicums and carpetgrass. These species produce an abundant source of feed but they are particularly low in the minerals, phosphorus and calcium. Much winter burning has been done to increase the phosphorus content of forage in the spring and calcium in the summer. However, even with the advantage of winter burning, the phosphorus content rarely exceeds 0.12 percent in the spring and declines to 0.06 percent by winter. Calcium reaches its highest concentration during mid-summer, when it may go up to 0.21 percent, but for most of the year calcium is below 0.16 percent. Thus, according to standards established by the National Research Council (1950), the forage rarely meets the calcium requirement and always falls below the phosphorus requirement for normal growth of young animals and reproduction of lactating cows.

Methods and possibilities of overcoming these apparent deficiencies in phosphorus and calcium have been a secondary part of various forest grazing studies conducted near Alapaha, Georgia, since 1942.[1] Bone meal, alone and in a mixture with salt, was fed free choice to young growing animals on burned and unburned range from 1942 through 1949. Other groups of steers and breeding cows were supplied with a mixture of salt and bone meal from 1947 through 1952.

Free-Choice Consumption of Salt, Bone Meal and Mixture

Comparisons were available from 1942 through 1949 in the free use by cattle of salt, steamed bone meal and a mixture of the two on both burned and unburned ranges. Groups of yearling and 2-year-old steers and heifers involved in forage management studies were confined to individual ranges from March through January. Six groups occupied ranges which had been partially or completely burned during the winter; two groups were confined to unburned ranges. A 3-compartment mineral box was located in each range. In all the boxes, one compartment provided free access to salt, the second compartment provided steamed bone

[1] *Cooperative investigations by U. S. Forest Service, Bureaus of Animal Industry and Plant Industry, Soils and Agricultural Engineering of the U. S. Department of Agriculture and Georgia Coastal Plain Experiment Station.*

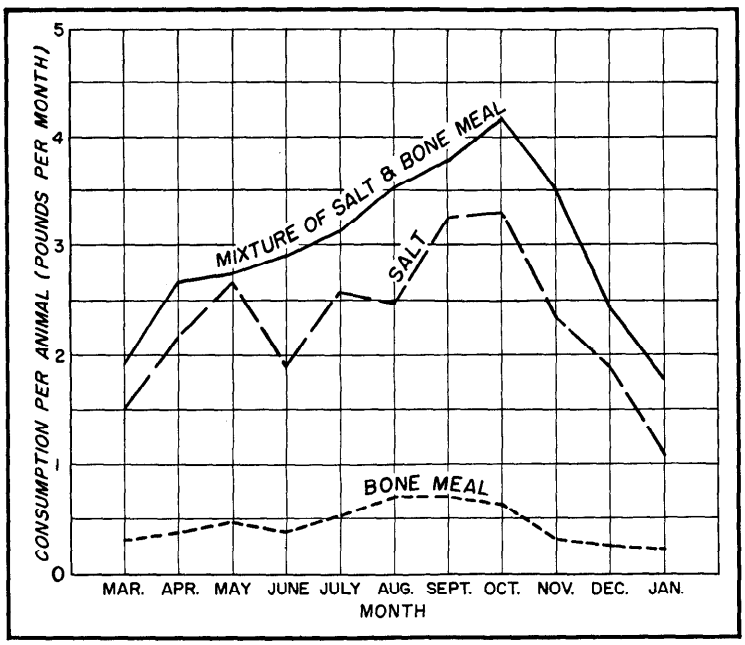

FIGURE 1. Cattle consumed greater amounts of bone meal when fed in mixtures with salt than in single choice. Mineral consumption fell off in October when supplemental feeding with peanut meal began.

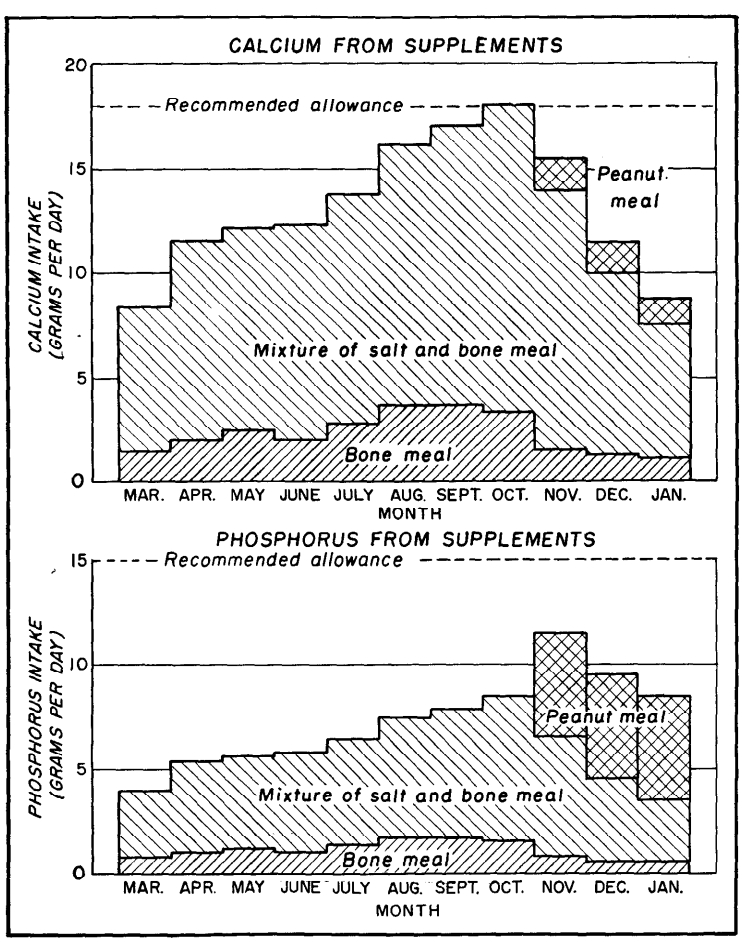

FIGURE 2. When cattle received peanut meal supplement, total calcium intake from supplements decreased (*upper graph*) and phosphorus intake increased (*lower graph*).

meal, and the third, a mixture of two parts steamed bone meal to one of salt by weight. The bone meal contained 7.1 percent crude protein, 32.6 percent calcium, and 15.2 percent phosphorus. Consumption of salt and minerals was checked every 28 days.

The trend was for lightest use of minerals in the spring and heavier use during the summer and early fall (Fig. 1). In other words, as the forage became more mature and phosphorus content declined, the consumption of salt and minerals became greater. Animals were reluctant to eat bone meal alone, as evidenced by the consumption of only 5 pounds per animal from March through January. They preferred the mixture of salt and bone meal. By means of this mixture, cattle consumption of bone meal was increased five times.

From mid-October through January, cattle were further supplemented at the rate of 2 pounds per head per day with peanut meal (43.5 percent crude protein, 0.16 percent calcium and 0.54 percent phosphorus). This decreased the craving for and consumption of salt, bone meal and mixture from the 3-compartment boxes. However, the peanut meal more than compensated for the decreased intake of phosphorus from bone meal, and the net effect was an increase in phosphorus consumption through the combined sources of bone meal, mixture and peanut meal (Fig. 2). Total calcium intake was slightly decreased as a result of the peanut-meal ration.

Large fluctuations occurred from year to year in the amounts of salt and minerals eaten. On the average, these young animals consumed a total of 36 pounds of salt and 26 pounds of bone meal (total from bone meal and mixture of salt and bone meal) from March through January. On a yearly basis, animals on burned range ate about the same total amount of minerals as animals

on unburned range. On a seasonal basis, cattle on unburned range tended to eat more mineral mixture during the spring but less during the summer than cattle on burned range.

Consumption of a Mixture of Salt and Steamed Bone Meal by Breeding Cows and Steers

Having established the fact that cattle will eat more bone meal and salt when supplied in mixtures in comparison with single choice, additional and larger groups of breeding cows and steers were supplied with a mixture only. The average mineral consumption by seasons and under various supplemental feeding practices from 1947 through 1952 is presented in Table 1.

Mineral consumption during the feedlot period (February 1–March 15), when cows were calving, was fairly high. This was probably because of the low phosphorus content of the roughage fed (sugarcane) and the easy access to mineral boxes which encouraged more frequent use of minerals. After cows were turned on forest range in the spring and relatively good quality native forage was available, the rate of mineral intake dropped considerably. Consumption of bone meal mixture increased through the summer and reached the highest rate during the fall. When cows were further supplemented with cottonseed meal during the summer, the intake of mineral mixture was decreased, but the total intake of phosphorus from both sources was increased. Mineral requirements for these mature animals during late fall and winter, when about one-half were in the final three months of pregnancy, were high. Animals then consumed large amounts of the mixture of salt and bone meal in addition to cottonseed meal (1 pound per day) in order to meet their mineral requirements.

Table 1. Average daily consumption of a mixture of salt and bone meal

Period of Year	Cows Not Fed Protein Supplement on Range	Cows Fed Protein Supplement on Range*	1- and 2-Year-Old Steers
	Pounds	*Pounds*	*Pounds*
In feedlot			
Feb. 1–Mar. 15†	.166	.167	—
On range			
Mar. 16–Apr. 15	.126	.107	.123
Apr. 16–June 30	.155	.089	.188
July 1–Oct. 15	.236	.173	.195
Oct. 16–Jan. 31‡	.241	.209	.173
Average	.203	.159	.171
Total yearly consumption	74	58	62

* These cows were fed 2 pounds of 41-percent cottonseed meal per animal per day from April 16 to June 30 and 1 pound per day from July 1 to October 15.

† Cows fed 2 pounds of 41-percent cottonseed meal and 25–30 pounds of sugarcane per animal daily in feedlot.

‡ All animals fed 1 pound of 41-percent cottonseed meal per head per day.

Younger animals (average weight 600 pounds) showed the same tendency towards low consumption during the early spring and toward an increase through the summer. Consumption of the mineral mixture decreased in the fall when cottonseed meal was fed, but again the total intake of phosphorus was actually increased.

Mature cows ate about 12 pounds more of the salt and bone meal mixture per head than the younger steers and heifers under comparable treatment. The difference occurred largely in late fall and winter, when mineral consumption by cows continued to be high.

The amount of mineral mixture eaten showed a wide yearly and monthly variation. Extremes in herd averages ranged from 40 to 92 pounds per animal per year, and from none to 13 pounds per month. There was no apparent correlation between amount of minerals eaten and the number of calves within a herd. Also, variation could not be attributed to fluctuations in rainfall.

Discussion and Conclusion

Amount and chemical composition of cattle diet must be known to form a strictly reliable basis for determining whether or not mineral requirements of cattle are fulfilled. In these experiments forage intake was not measured, and chemical analyses were made from forage samples estimating cattle diet. Therefore, suppositions as to whether or not sufficient minerals were supplied are made with these reservations in mind.

When mineral sources such as steamed bone meal are fed alone, cattle do not eat enough to meet their requirement. By mixing steamed bone meal with salt, greater mineral consumption is induced and the average bone meal intake, as indicated in these tests, insures sufficient calcium for dry cows and one- or two-year-old steers or heifers throughout the year. Calcium may be deficient, however, for lactating cows the first 3 to 4 months after parturition, when calcium requirements are high and the forage is relatively low in this mineral. At such times animals may have to draw on body reserves. Based on standards set up the the National Research Council, phosphorus intake through mineral mixture and native forage is sufficient for dry cows, although it approaches the critical point for much of the year. Nursing cows require more phosphorus than they generally obtain from these combined sources. This deficiency can be largely or fully overcome by feeding other supplements, such as cottonseed meal at the rate of 1 or 2 pounds per animal daily.

LITERATURE CITED

NATIONAL RESEARCH COUNCIL. 1950. Recommended nutrient allowances for beef cattle. Report no. 4.