SOIL DEPTH CHANGES IN pH IN COASTAL AND COMMON BERMUDAGRASS PASTURES UNDER LONG-TERM STOCKING AND FERTILITY MANAGEMENT

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Background. A detailed description of stocking rates and fertility regimens from 1969 through 2005 are presented in a companion 2006 Field Day Report by Rouquette et al. The objective of this experiment was to evaluate changes in soil pH in bermudagrass pastures under different fertility management strategies.

Research Findings. From 1969 to 1987, bermudagrass pastures received limestone application rates varying from 1 to 2 tons/ac. On average, about 9 tons of limestone were applied to bermudagrass pastures during this period. From 1988 to 2001, only bermudagrass pastures fertilized with N and overseeded with ryegrass were limed. In 2002, all pastures were treated with limestone. Soil pH markedly increased from 1985 (average pH = 5.3) to 2004 (average pH = 6.0) (Figure 1). Larger increases in soil pH were observed from 1985 to 1994. Bermudagrass pastures receiving no N, K, and clover exhibited a slight decline in soil pH from 1994 to 2004, especially in the top 0-6-in depth due to the low rate of lime application during this period (total of 1 ton/ac applied in 2002). Even with much less limestone applied, soil pH in the bermudagrass -no N-clover pasture remained well above that for pastures fertilized with N.

Bermudagrass pastures overseeded with clover and without N fertilizer showed greater soil pH than pastures overseeded with ryegrass and fertilized with N. Although bermudagrass +N +ryegrass pastures received greater (total of 3 tons) lime applications than bermudagrass without N +clover pastures, soil pH in the upper horizons was almost one unit smaller (more acidic) in the N fertilized pastures. That occurred because bermudagrass +N pastures received considerable amounts of N fertilizer. Conversion of the ammonium form to nitrate (nitrification), contributed to soil acidification, and larger lime application rates were required to maintain adequate soil pH for forage growth. In contrast, bermudagrass without N +clover pastures, receiving no lime for more than 14 years (1988-2001), maintained higher pH values. That suggests that symbiotic N_2 fixation by clover had much less effect on lowering soil pH, and less limestone was needed to maintain favorable soil conditions for bermudagrass-clover pastures.

There were no significant differences in soil pH between common and Coastal bermudagrass pastures. Similarly, stocking rates showed no effect on soil pH. As expected, fertility regimens played a much more important role than bermudagrass species and stocking rates on soil pH.

Applications. Bermudagrass pastures should be soil sampled on a routine basis and during the same season to determine lime requirements. Nitrogen fertilization can considerably increase soil acidity, and additional lime application may be required to maintain an adequate soil pH for forage production. Clover is an economic and agronomically viable alternative to supply N to bermudagrass pastures and to reduce lime applications on acidic soils.

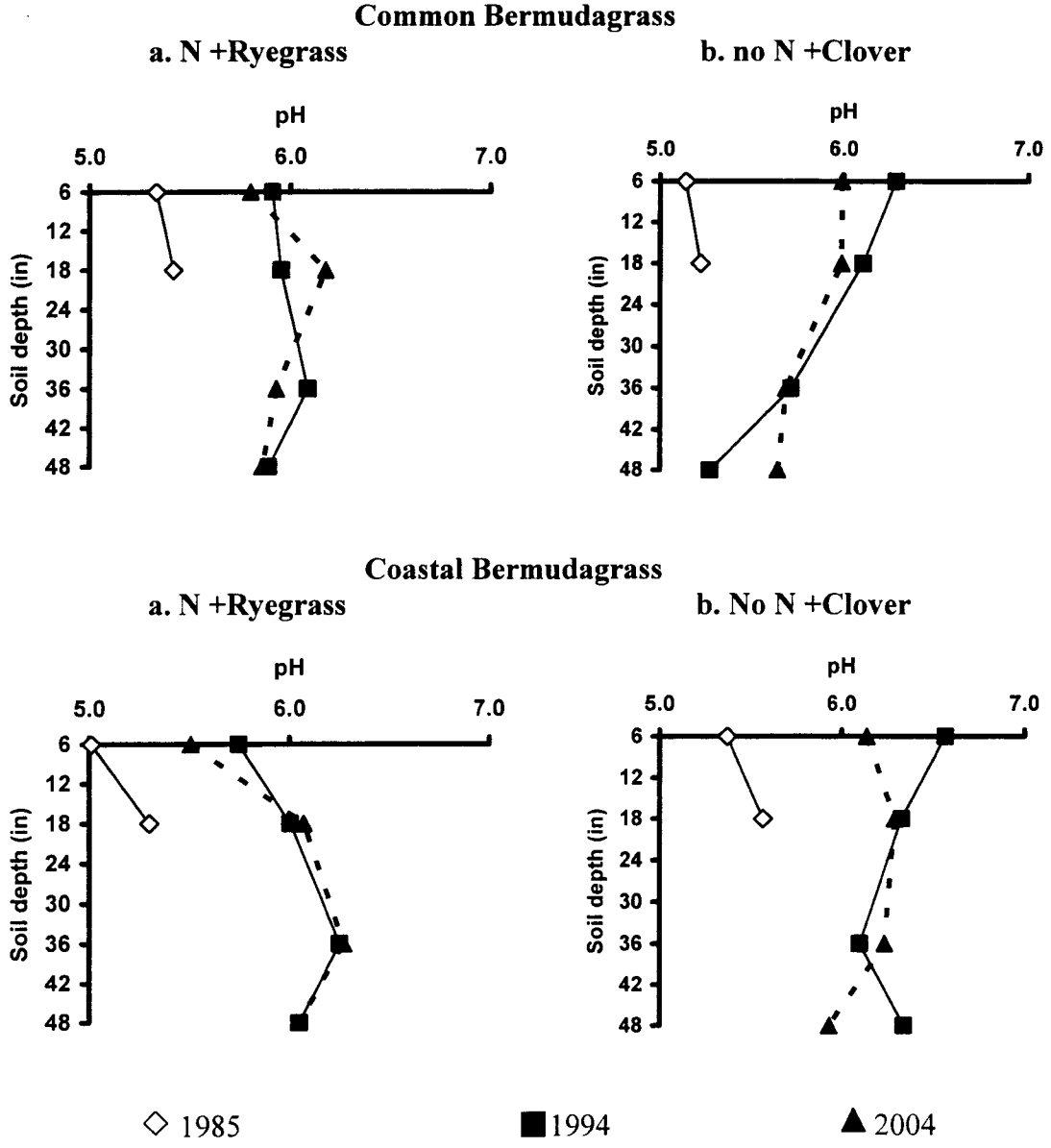

Figure 1. Soil pH in common and Coastal bermudagrass pastures under different fertility regimens.