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# FORAGE-LIVESTOCK FIELD DAY REPORT - 1998

## TEXAS A&M UNIVERSITY AGRICULTURAL RESEARCH and EXTENSION CENTER at OVERTON

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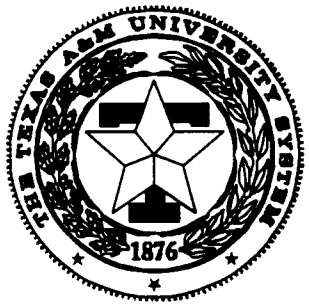


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# SOIL pH OF BERMUDAGRASS PASTURES UNDER LONG-TERM STOCKING RATES AND FERTILITY REGIMENS

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**Background.** Grazing of 'Coastal' and common bermudagrass research pastures at TAMU-Overton began in 1969. Each variety was grazed at three stocking rates and received split-applied total annual fertilizer levels of 200-100-100 lbs/ac ($N$-$P_2O_5$-$K_2O$) from 1969 through 1984. From 1985 through 1997, Coastal and common bermudagrass pastures at each of 3 stocking rates were subdivided into the two following treatments: (1) overseeded with annual ryegrass and fertilized with N only; and (2) overseeded with clover and fertilized with K only. Phosphorus applied the previous 15 years and recycling of nutrients via excreta had provided for adequate soil P levels so that no P was applied to any pastures from 1985 through 1997. The objective of this nutrient cycling experiment was to monitor soil pH as influenced by fertility status and stocking rate.

**Research Findings.** A history of lime applications to research pastures in the 28-year nutrient cycling study is presented in Table 1. From 1969 to 1984, when all bermudagrass pastures were fertilized identically, a total of 6 tons/ac lime was applied. During this 15-year period, an average of 0.4 tons lime (800 lbs) per acre was applied. From 1985 through 1997 (13 years), a total of 5.25 tons lime/ac was applied to the ryegrass + N-treated pastures (0.404 tons or 808 lbs/ac per year); whereas, 3 tons lime/acre was applied to clover + K-treated pastures (0.231 tons or 462 lbs/ac per year). It is of economic significance that no additional lime has been required for the clover + K-treated pastures during a 10-year period (1987-1997). The pH of these clover + K pastures has remained at 6.11 to 6.46.

Table 2 presents soil pH analyses (10 samples per treatment at each depth) from 1996. Considering the previously mentioned lime applications, there was no difference in soil pH between Coastal and common bermudagrass from 0 to 18" depth. From 18" to 60", there was a trend for soil pH of common bermudagrass to be lower than that of Coastal bermudagrass. This occurrence may be due to changes in soil type on these pastures and/or efficiency of plant responses to fertility and lime. The influence of fertility (N vs K) significantly affected pH at the 0 to 36" soil depths; however, from 36" to 60", there was no difference in pH between fertility treatments.

Stocking rate and the interactions of stocking rate with bermudagrass and with fertility significantly ($P<.01$) affected soil pH. For the purposes of this report, only the main effect of stocking rate has been presented. With these forage utilization-stocking densities, there was a trend for soil pH to be highest on the high stocked pastures at every soil depth and for soil pH to be lowest on the low

stocked pastures at every soil depth. This would suggest that high stocking rates (2 to 3 cow-calf units/ac) had no adverse effects on soil pH. The presence of animal treading and excreta may have contributed to the soil pH status being higher on the high stocked pastures.

**Application.** With nitrogen applications to pastures (200 to 400 lb N/ac per year) and with overseeded winter pastures, about .4 tons/ac per year may be required to maintain soil pH above 6.0. With no nitrogen applied for 12 years on clover overseeded bermudagrass pastures, additional lime may not be required to maintain pH above 6.0 assuming an adequate quantity has been applied prior to the initiation of such a management treatment. From only a liming-cost perspective, the non-N pastures had approximate savings of $12 per acre per year. Total forage requirement must be considered before nutrients are omitted from fertilization-lime applications.

Table 1. Lime applications to pastures during 28-year period (1969-1997).

| Date | Lime Rate (tons/ac) | Pastures |
|---|---|---|
| 1969 | 2 | All |
| 1980 | 2 | All |
| 1981 | 1 | All |
| 1984 | 1 | All |
| 1985[1]* | 2 | RG&CL |
| 1987 | 1 | RG&CL |
| 1991 | 1.25 | RG only |
| 1994 | 1 | RG only |
| 1997 | 0.5 | RG only |

[1]Initiation of fertility x species treatment in which stocking rate pastures were divided into ryegrass + N (RG) and clover + K (CL).

Table 2. Soil pH at various soil depths in bermudagrass pastures after 12 years of fertility x stocking rate treatments (1996).

| 1996 | Soil Depths | | | | |
|---|---|---|---|---|---|
| | 0-6" | 6-18" | 18-36" | 36-48" | 48-60" |
| Bermudagrass | | | | | |
| Coastal | 6.19 a[1] | 6.26 a | 6.32 a | 6.32 a | 6.43 a |
| Common | 6.18 a | 6.22 a | 6.10 b | 5.91 b | 5.86 b |
| Fertility | | | | | |
| Clover + K | 6.43 a | 6.46 a | 6.31 a | 6.12 a | 6.11 a |
| Ryegrass + N | 5.95 b | 6.01 b | 6.12 b | 6.11 a | 6.18 a |
| Stocking Rate | | | | | |
| High | 6.27 a | 6.45 a | 6.55 a | 6.63 a | 6.67 a |
| Medium | 6.28 a | 6.26 a | 6.17 b | 5.89 b | 6.03 b |
| Low | 6.02 b | 6.01 b | 5.92 c | 5.82 b | 5.74 c |

[1]Numbers within a soil depth and major treatment category and followed by a different letter, differ significantly (P<.01).