FORAGE-LIVESTOCK FIELD DAY REPORT - 1998

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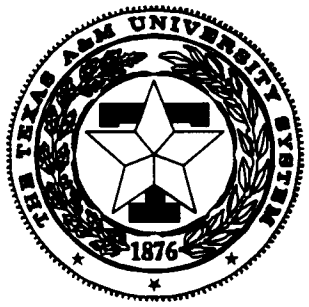

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SOIL PHOSPHORUS IN BERMUDAGRASS PASTURES UNDER LONG-TERM STOCKING RATES AND FERTILITY REGIMENS

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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. No phosphorus was applied to any of the pastures from 1985 through 1997. Soil P was extracted using acidified ammonium acetate with EDTA. The extract was analyzed for P colormetrically using molybdenum blue method. The objective of this experiment was to ascertain soil P status in bermudagrass pastures after 12 years of non-P applications.

Research Findings. After 15 consecutive years of applying annual rates of 100 lbs P_2O_5 /ac, there were 28 to 34 ppm P in the 0-6" soil depth and 18 to 21 ppm P in the 6-18" soil depth (Table 1). Within a soil depth, soil P was relatively consistent between Coastal and common bermudagrass, as well as among high, medium, and low stocking rates. The soil P levels in 1985 (Table 1) would be rated as moderate to high. During the course of this long-term grazing experiment, 1500 lbs P_2O_5 (654 lbs P) have been applied to bermudagrass pastures.

After 12 years of non-P application (Table 2), soil P level was different between Coastal and common bermudagrass pastures at every soil depth increment between 0 and 60" except in the 6-18" strata. Although soil P was higher in common bermudagrass pastures in the 0-6" soil depth, soil P was higher in Coastal bermudagrass pastures in the 18 to 60" depths.

Differences in soil P between clover + K vs ryegrass + N treatments were noteworthy at soil depths from 0-36". Soil P was lower in the clover + K treated pastures as a possible result of pH status during the 12 years (1985-1996), addition of K to provide a better soil fertility environment for P uptake, and greater uptake of P by clover vs ryegrass. From 36" to 60", however, there were no differences in soil P between the two fertilizer treatments.

In general, there was a trend for higher soil P levels at high stocking rates (2 to 3 cow-calf pair/ac) compared to either the medium (1.5 pair/ac) or the low stocking rate (1 pair/ac). With the relatively low percent of P retention by the animal's body, excreta was primarily responsible for the recycling of this plant food nutrient.

Application. Data from these grazed pastures on upland, sandy soils in East Texas showed that under improved pasture conditions with a prior history of P application, additional P fertilization may not necessarily be an annual requirement. However, under exclusive haying operations in which P is removed with the forage (hay), P applications may be necessary on an annual basis as indicated by soil test. Under fertility regimens used on these pastures for more than 25 years, P did not accumulate as a potential environmental contaminant. Except at the low stocking rate, soil P remained adequate for optimum growth of bermudagrass. Soil P in all treatments was sufficiently abundant for ryegrass production.

Table 1. Soil phosphorus status of bermudagrass pastures after 15 years of P application (1969-1984).

1985 Bermudagrass	Soil Depths					
	0-6"			6-18"		
	P (ppm)					
	Min	Max	Avg	Min	Max	Avg
Coastal	23	31	28	15	27	21
Common	25	42	34	10	26	18

Table 2. Soil phosphorus at various soil depths in bermudagrass pastures after 12 years of fertility x stocking rate treatments (1985-1996) without P applications.

	Soil Depths				
	0-6"	6-18"	18-36"	36-48"	48-60"
	P (ppm)				
Bermudagrass					
Coastal	22.9 b[1]	15.2 a	9.1 a	4.3 a	3.7 a
Common	31.4 a	16.1 a	2.3 b	0.13 b	0.3 b
Fertility					
Clover + K	23.0 b	12.5 b	3.8 b	2.1 a	1.8 a
Ryegrass + N	31.3 a	18.8 a	7.6 a	2.3 a	2.2 a
Stocking Rate					
High	33.3 a	19.9 a	7.9 a	4.5 a	4.5 a
Medium	30.1 a	15.6 b	4.8 b	1.1 b	0.3 b
Low	18.1 b	11.3 c	4.4 b	1.0 b	1.2 b

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