Soil pH, nitrate-nitrogen, phosphorus, and potassium in Coastal and common bermudagrass pastures after 48 years of stocking

F.M. Rouquette, Jr.[1], K.L. Turner[1], K.D. Norman[1], M.L. Silveira[2], and G.R. Smith[1]
[1] Texas A&M AgriLife Research, Texas A&M Agricultural Research and Extension Center, Overton, TX.
[2] University of Florida, Range Cattle Research and Education Center, Ona, FL.

Application: 'Coastal' and common bermudagrass have been used for pastures in East Texas for more than 80 years.

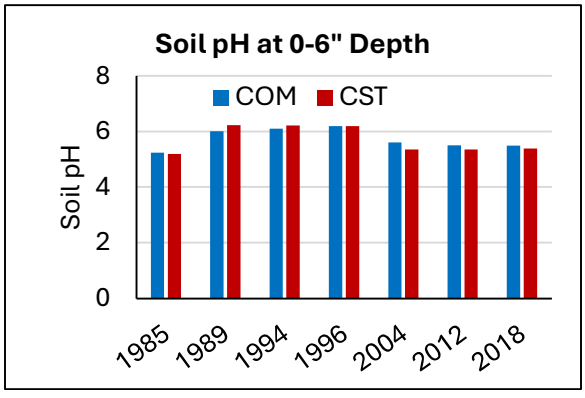
Introduction: The primary objectives of this project were to compare soil nutrient status of Coastal and common bermudagrass pastures under stocking.

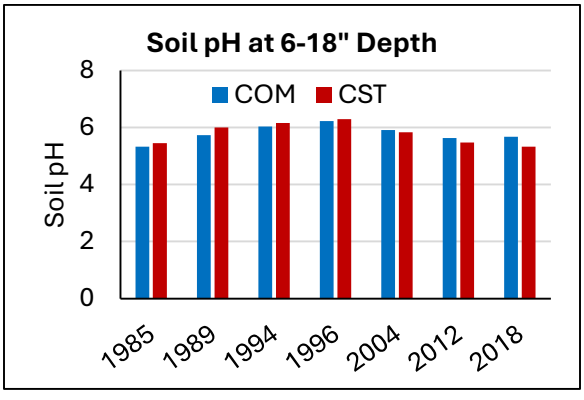
Materials and Methods: 'Coastal' and common bermudagrass (BG) were established in different sized pastures at the Overton Center in 1968. Three different stocking rates of each BG were initiated in 1969 using cow-calf pairs. From 1969 through 1984, annual fertilization was 200-44-83 (N-P-K) with split applications of N. The BG pastures were grazed as pure stands through 1974. In fall 1974, all pastures were overseeded with mixtures of annual ryegrass plus clover and stocked starting in Feb-Mar to Oct each year through 1984. In fall 1984, all pastures were subdivided with one half overseeded with ryegrass + N fertilizer and the other half overseeded with clover without N fertilizer. From spring 1985 to 2018, these overseeding and stocking rate regimens have been in place. Fertilization of pastures with N has been split-applied with a single application of P and K (Table 1).

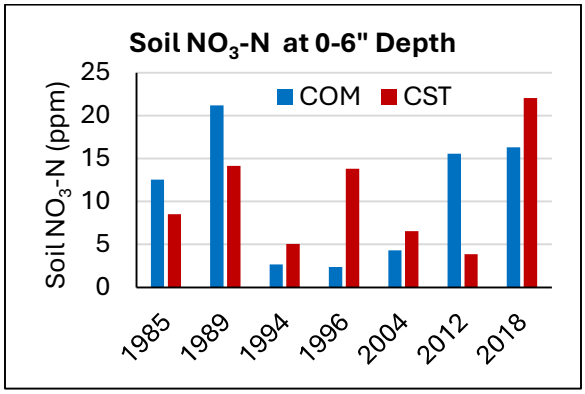
Table 1. Annual fertilizer[1,2] applications on bermudagrass pastures during various periods.

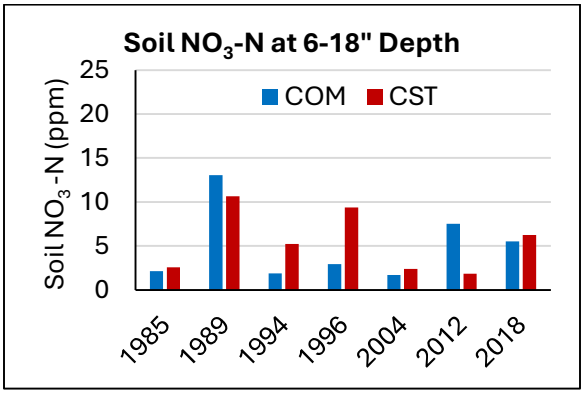
		Ryegrass + N			Clover + No N		
Period	**No Years**	**N**	**P**	**K**	**N**	**P**	**K**
			lb/ac			lb/ac	
1985-1989	5	410	0	0	0	0	85
1990-1997	8	250	0	0	0	0	85
1998-2004[3]	7	303	46	85	0	46	85
2005-2018[4]	14	278	30	54	0	30	54

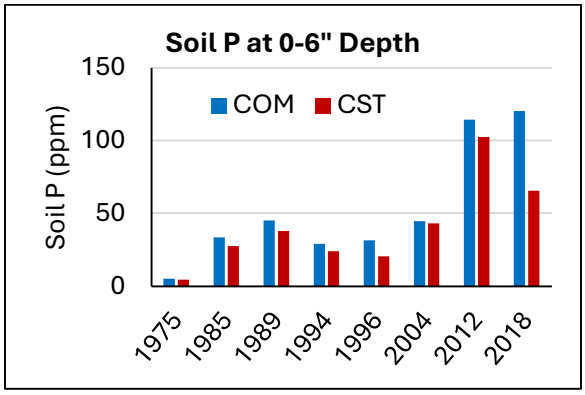
[1] Fertilizer P_2O_5 x 0.46 = P; K_2O x 0.83=K.
[2] Limestone was applied to all pastures at 6 t/ac from 1968-1984; 8 t/ac from 1985-2005; 3.5 t/ac from 2006-2013.
[3] From 1998-2004, all pastures received S, Mg, and B at 50, 27, and 1.0 lb/ac, respectively.
[4] From 2005-2018, all pastures received S, Mg, and B at 28, 15, and 0.7 lb/ac, respectively.

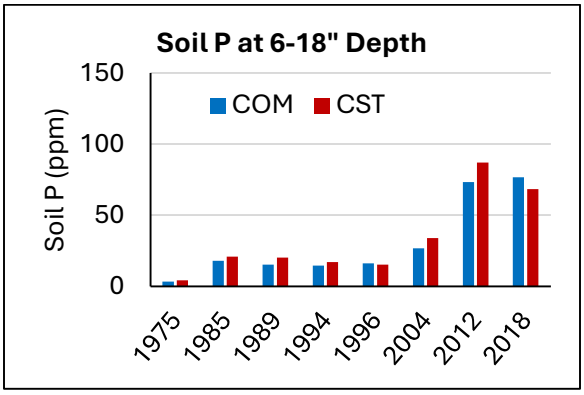


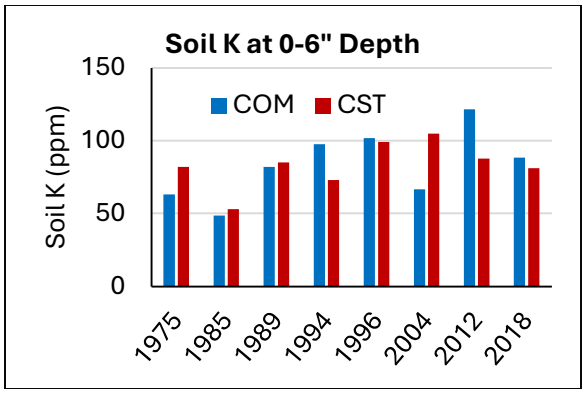


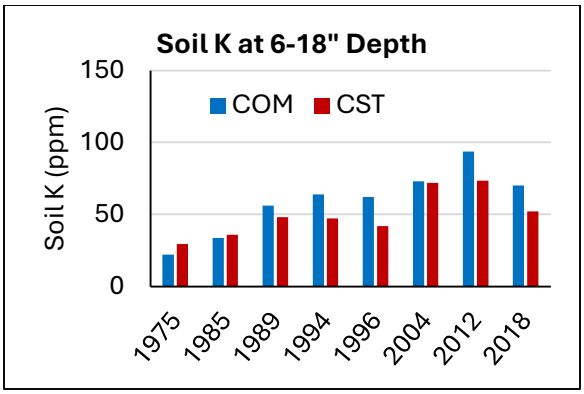












***Results*:**
Soil pH at 0-6” and 6-18” was similar for Coastal and common BG pastures throughout the stocking period. Soil nitrate-N levels at 0-6” and 6-18” depths showed no distinct patterns between bermudagrasses from 1985 – 2018. With a decrease in N rates from 1990 – 1997, there was a decline in soil nitrate-N levels. Although soil nitrate-N levels increased in 2018, the amount available in pastures was very low at approximately 30-40 lb/ac at 0-6” and less than 20 lb/ac at 6-18” soil depths. Soil P and K were greater at the 0-6” depth in common vs Coastal pastures, which may have been a result of reduced dry matter production of common BG.

***Conclusions and Implications*:**
Levels of soil nutrients in common and Coastal BG pastures did not show a build up after 48 years of fertilization and stocking.