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SUSTAINABILITY OF BERMUDAGRASS PASTURES UTILIZED AT DIFFERENT STOCKING RATES

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Background. Previous small-plot research has shown that the height of bermudagrass at harvest was less important in stand survival than either frequency of defoliation or level of fertilization. Most of the small plot and grazing experiments, however, have not been of sufficient duration or design to evaluate the long-term soil-plant-animal interactions. In view of economic considerations and an awareness to reduce surface and ground water contamination with fertilizers, especially nitrates, the objective of this research was to evaluate the long-term influence of grazing pressure and presence or absence of nitrogen (N) fertilizer on sustained production of common and Coastal bermudagrass pastures.

Research Findings. Both 'Coastal' and common bermudagrass pastures which were fertilized identically for 16 years were divided into N and non-N fertilizer pastures. During the following seven years of N *vs* non-N treatments, the season-long (200 days) stocking rates necessary to create graded levels of forage availability ranged from 0.9 AU/ac for low (L) on common bermudagrass to 3.2 AU/ac for high (H) on Coastal bermudagrass (Table 1). With the exception of average daily gain at the medium (M) and L levels on Coastal bermudagrass, there was an overall advantage in pasture production from the ryegrass + N treatment. Pastures that were oversown with crimson and/or arrowleaf clover and fertilized with K were well sustained when grazed at medium or low grazing pressures (Table 2). At high grazing pressures, however, common bermudagrass was thinned more than Coastal (18% vs 11% bare ground), and common also had more species invasion than Coastal (4% vs 1.4%) on the non-N fertilized pastures. Other pasture characteristics were affected ($P<.01$) at both the high and low grazing pressures by bermudagrass cultivar and fertility level. Components in the medium grazing pressure were not affected by treatment.

Application. Bermudagrass, because of its deep rooting characteristics and relatively high biomass production (10 to 15 ton/ac), is efficient in recycling plant food nutrients under grazing conditions. Bermudagrass pastures may be sustained under a wide range of management expertise. Although bermudagrass responds positively to moderate-to-high rates of N fertilization, the long-term economy of production and environmental sustainability may favor the use of clovers and non-N fertilizers under systems of moderate-to-low intensity of utilization.

Table 1. Percent advantage in bermudagrass pasture production from ryegrass and nitrogen over clover and potassium.

Grazing pressure		Bermuda-grass	Calf[a]			
			ADG	Gain/ animal	Gain/ ac	Stocking rate (AU/ac)
Level	AU/ac[b]		Ryegrass + N advantage (%)			
High	3.2	Coastal	20.5	21.8	29.9	12.1
High	2.2	Common	43.2	50.0	55.3	10.7
Medium	2.0	Coastal	-6.1	7.2	27.2	24.2
Medium	1.5	Common	.9	12.0	14.5	3.4
Low	1.2	Coastal	-1.1	3.9	29.3	22.7
Low	0.9	Common	6.3	17.3	23.0	5.7

[a]Negative numbers indicate an advantage for clover and potassium.
[b] One Animal Unit (AU) = 1500 lb.

Table 2. Grazed bermudagrass sward composition under two overseeding-fertility regimens and three levels of grazing pressure.

Bermuda-grass	Sward	Fertilizer and grazing pressure					
		Clover + K					
		High		Med		Low	
		%	SE[b]	%	SE	%	SE
Common	Live	55.8	5.8	62.6	3.1	62.1	1.6
	Dead	22.0	3.1	32.5	2.9	34.1	1.7
	Soil	18.3	3.9	0.4	.4	0.0	-
	Other	4.0	1.3	4.5	1.6	3.5	1.6
	Cover[a]	77.8	4.1	95.1	1.4	96.2	1.4
Coastal	Live	73.1	3.7	70.8	1.7	49.0	1.3
	Dead	14.6	2.3	24.3	2.6	51.0	1.3
	Soil	10.9	3.7	1.2	1.0	0.0	-
	Other	1.4	.7	3.7	1.2	0.0	-
	Cover[a]	87.7	4.2	95.1	1.1	100.0	-
		Ryegrass + N					
Common	Live	71.4	2.1	67.1	3.4	66.3	2.2
	Dead	26.4	1.6	32.9	3.4	33.8	2.2
	Soil	2.0	.4	0.0	-	0.0	-
	Other	0.2	.2	0.0	-	0.0	-
	Cover[a]	97.8	.6	100.0	-	100.0	-
Coastal	Live	87.9	1.1	67.5	1.2	62.8	1.3
	Dead	8.6	1.0	32.1	1.2	37.3	1.3
	Soil	3.5	.6	0.4	.4	0.0	-
	Other	0.0	-	0.0	-	0.0	-
	Cover[a]	95.5	.6	99.6	.4	100.0	-

[a]Cover rating is combination of live and dead.
[b]Standard Error (SE) of mean.