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SUSTAINED PRODUCTION FROM INTENSIVELY USED BERMUDAGRASS PASTURES WITHOUT APPLICATION OF NITROGEN FERTILIZER

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Background. Livestock production from pastures is associated with numerous management concerns. Two of the predominant concerns are: (1) total production costs and cash flow necessary to operate; and (2) resource conservation. Forages represent the premiere resource conservation crop since they dramatically reduce soil erosion and are efficient users of plant nutrients in animal waste and fertilizers. Use of compatible, adaptive forages has the potential to recycle plant food nutrients under grazing conditions. A grazing study was initiated in the fall of 1984 to evaluate sustained production of common and 'Coastal' bermudagrass under intensive grazing conditions. Prior to initiation of this study, pastures had been fertilized annually with a total of 200-100-100 lbs/ac of N-P₂O₅-K₂O in split applications. Thereafter, the following two fertility-winter annual forage treatments were imposed on each bermudagrass: (1) arrowleaf and crimson clover overseeded plus an annual fertility rate of 0-0-115; (2) ryegrass overseeded plus an annual fertility rate of 400-0-0. Available soil phosphorus tested high in 1984.

Research Findings. To date, stand maintenance of Coastal bermudagrass pastures without fertilizer N has been good to excellent. In the medium and high stocked Coastal bermudagrass pastures, there has been slight invasion by bahiagrass. In the high stocked common bermudagrass pasture there has been a significant invasion by bahiagrass and crabgrass and the bermudagrass stand is moderately thin. At the low stocking rates on both common and Coastal bermudagrass, stands remain in excellent condition even without N fertilizer for 7 years. A 5-year summary of animal performance revealed that pastures fertilized with N and overseeded with ryegrass had a general advantage in certain production areas (Tables 1 and 2). The ryegrass + N pastures provided about 12% more grazing days due to earliness. On Coastal bermudagrass pastures, the 12 to 24% stocking rate advantage of ryegrass + N was responsible for the nearly 30% advantage in calf gain per acre. Although the ryegrass + N common bermudagrass pastures had only a 3 to 11% stocking rate advantage, the gain per acre advantage ranged from 14.5 to 55%. The most dramatic difference occurred on the high stocked pastures and was an indication of response to grazing pressure. At both the medium and low stocked Coastal bermudagrass pastures, ADG was similar with clover + K₂O having an advantage over ryegrass + N. A comparison of performance in spring vs. summer shows the similarities in ADG between treatments at the medium and low stocking rates. In addition, the stocking rate advantages of the ryegrass + N treatments occurred

primarily in the summer period with Coastal having a 20 to 37% advantage in production; whereas, common showed slight to no advantage.

Application. Bermudagrass pastures may be sustained satisfactorily without fertilizer N provided that soils are not deficient in major nutrients, a legume is overseeded, potassium fertilizer is applied, and grazing pressures are moderate to light. Annual fertilizer costs per pound of calf gain are lower for the clover + K treatment by about 4-fold over the ryegrass + N treatment. The management of pastures using recycled nutrients appears to offer a viable alternative to East Texas producers.

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

			CALF ¹			
Grazing Pressure		Bermuda-grass	ADG	Gain/ Animal	Gain/ Acre	Stocking Rate (AU/ac)
Level	AU/ac		-----Ryegrass + N advantage (%)-----			
High	3.21	Coastal	20.5	21.8	29.9	12.1
High	2.15	Common	43.2	50.0	55.3	10.7
Medium	1.98	Coastal	-6.1	7.2	27.2	24.2
Medium	1.45	Common	.9	12.0	14.5	3.4
Low	1.19	Coastal	-1.1	3.9	29.3	22.7
Low	.88	Common	6.3	17.3	23.0	5.7

¹Negative numbers indicate an advantage for clover and potassium

Table 2. Seasonal advantage in bermudagrass pasture production from ryegrass and nitrogen over clover and potassium.

			<u>ADG¹</u>		<u>STOCKING RATE¹</u>	
<u>Grazing Pressure</u>		<u>Bermuda-</u>	<u>Spring</u>	<u>Summer</u>	<u>Spring</u>	<u>Summer</u>
<u>Level</u>	<u>AU/ac</u>	<u>grass</u>	-----Ryegrass + N advantage (%)-----			
High	3.21	Coastal	5.4	13.4	7.0	19.8
High	2.15	Common	43.9	43.8	8.1	10.5
Medium	1.98	Coastal	1.8	-15.1	5.7	36.9
Medium	1.45	Common	2.1	3.6	4.1	-3.6
Low	1.19	Coastal	0	-6.5	9.4	32.6
Low	.88	Common	0	7.3	13.0	2.6

¹Negative numbers indicate an advantage for clover and potassium.