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YIELD RESPONSE OF ANNUAL RYEGRASS-COASTAL BERMUDAGRASS TO BROILER LITTER PLUS N FERTILIZER

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Background. An estimated 400,000 tons of broiler litter are generated by the broiler industry each year in northeast Texas. Broiler litter is particularly well suited as a plant nutrient source for pastures because it is relatively dry (75 to 80% dry matter), is essentially totally collectable, and has a higher nutrient content than other animal manures. Broiler litter is good for the low fertility, sandy, acid soils in East Texas because it contains 1) all the essential plant nutrients, 2) organic matter to improve water and nutrient holding capacity, 3) calcium that helps prevent a drop in soil pH, and 4) it can be lower cost than commercial fertilizer. If broiler litter is applied at a rate to meet the N requirements of the pasture only about 25% of the phosphorus (P) and about 66% of the potassium (K) is taken up. These unused nutrients buildup in the soil or are lost. Reducing the broiler litter rate and applying commercial nitrogen (N) fertilizer should improve the utilization of P and K. Four tons/acre of broiler litter were applied in October 1998 and 1999 to Coastal bermudagrass overseeded with annual ryegrass. Fifty lb N/acre were applied 1, 2, 3, or 4 times/year in December, March, May, and/or July.

Research Findings. Ryegrass yields were lower in 2000 than 1999 because drought required replanting in November 1999 that limited early ryegrass production (Table 1). Bermudagrass yields were slightly higher in 2000 than 1999. Total forage production was not different between the two years. Ryegrass was very responsive to N fertilizer with yields of about 6400 lb/acre occurring when N was applied in both December and March. The next highest ryegrass yields of 6000 lb/acre were those treatments with a March and May N application. Slightly lower yields of 5400 lb/acre were produced when N was applied only once in December or March. Applying N when ryegrass was not growing (May, July, May + July) resulted in the lowest ryegrass yields that were similar to the no N treatment. Maximum bermudagrass yields of about 6000 lb/acre were produced when N was applied three or four times/year. Bermudagrass yields were slightly less at 5200 lb/acre if N was applied in May and July which implies there was some N carryover from the March N application to the ryegrass. Nitrogen applied only in December and/or March when bermudagrass was dormant, resulted in the lowest bermudagrass yields that were similar to the no N treatment. Competition from the ryegrass in late spring and the poor moisture conditions during late summer and early autumn limited bermudagrass growth in this study.

Total yield peaked at 11,900 lb/acre when N was applied three or four times/year. The next highest yielding treatments of about 10,700 lb/acre were when N was applied in March and May or in December and March for a total of 100 lb N/acre. The March application was common to both treatments and is at the beginning of the peak ryegrass growth period. Applying N in May and July or a single N application in any month produced yields of only 9000 lb/acre. The no N treatment produced the least forage substantiating that the amount of N in 4 tons/acre of broiler litter did not meet the N requirements of the ryegrass-bermudagrass system.

Application. Combining commercial N fertilizer with 4 tons/acre of broiler litter did increase yields of annual ryegrass-Coastal bermudagrass. Each 50 lb N/acre increased yields by about 1000 lb/acre up to 150 lb N/acre.

Table 1. Ryegrass, bermudagrass, and total yield by year and nitrogen treatment for two years.

	Ryegrass	Bermudagrass	Total
	-----lb dry matter/acre-----		
Year			
1999	5883 a†	4345 b	10,228 a
2000	4555 b	5224 a	9,779 a
50 lb N/month			
None	4201 d	3781 d	7,982 e
Dec.	5429 c	3863 d	9,292 cd
Mar.	5342 c	4286 d	9,628 cd
May	4141 d	4975 c	9,116 cd
July	4130 d	4893 c	9,023 d
Dec., Mar.	6414 a	4191 d	10,605 b
May, July	4584 d	5165 bc	9,749 c
Mar., May	5910 b	4936 c	10,846 b
Mar., May, July	5932 b	6033 a	11,965 a
Dec., Mar., May, July	6111 ab	5723 ab	11,834 a

†Values within columns for year and nitrogen treatment followed by the same letter at not significantly different at 0.05 level.