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ADDITION OF COMMERCIAL FERTILIZER OR CLOVER WITH BROILER LITTER FOR RYEGRASS-COASTAL BERMUDAGRASS PRODUCTION

G. W. Evers, D. S. Doctorian, and A. D. Davidson

Background. The broiler industry in East Texas generates about 400,000 tons of broiler litter (BL) each year. Because BL is high in plant nutrients, most of it is applied to pastures instead of using commercial fertilizer. The main disadvantage of using BL as the only plant nutrient source is that the nitrogen:phosphorus:potassium ratio in the litter does not match warm-season perennial grass needs. Only about a fourth of the phosphorus (P) is taken up. Continued use of BL as the only nutrient source will result in a P buildup in the soil that may cause environmental problems. Phosphorus can move into creeks and rivers in runoff from heavy rains and cause oxygen depletion which results in fish kills.

A study was conducted at the Texas A&M University Agricultural Research and Extension Center at Overton to evaluate management practices that might reduce the soil P buildup when using BL as a plant nutrient source. The objective of these management practices were to provide additional N to increase forage production and thereby remove more P. Six tons of BL were applied in the fall (28 Oct. 1994), in the spring (27 April 1995), or split equally between the fall and spring to Coastal bermudagrass overseeded with annual ryegrass in the fall. A duplicate set of treatments received 75 lb N and 50 lb K per acre after each harvest. Two additional treatments were seeding crimson clover to add N with the ryegrass with a spring or fall BL application. Forage production from the various treatments will be presented. Only the second year of the 3-year study will be reported. The study was harvested monthly from January through September 1995, except for July.

Research Findings. Fall-applied BL favored ryegrass production and spring-applied BL favored bermudagrass production (Table 1). Splitting the BL between fall and spring produced almost as much ryegrass as the fall-applied BL but about 1500 lb/acre less bermudagrass than the spring-applied BL. Timing of BL application had no effect on total yield (ryegrass + bermudagrass) with all three treatments producing about 9000 lb DM/acre. Applying additional N and K fertilizer after each harvest increased ryegrass, bermudagrass, and total forage production regardless of BL application time. The idea of increasing forage production by combining BL with commercial N and K fertilizer did work but was uneconomical at the BL and commercial fertilizer rates used in this study. The 600 lb/acre of N fertilizer only produced an additional 3000 to 5000 lb DM/acre of forage. The 6 tons of BL contained approximately 270 lb of available N for a total of 870 lb N/acre. As the amount of N applied increases, the percent N utilization decreases. Lower rates of BL and

commercial N fertilizer might achieve the goal of economically increasing forage production.

Adding crimson clover to the ryegrass-bermudagrass system did not increase total forage production. Timing of BL application did influence yield of the different species. Fall BL application resulted in higher ryegrass yields and lower clover yields because the N in the BL enhanced ryegrass growth which increased competition to the clover. Adding clover suppressed bermudagrass production, particularly with fall-applied BL.

Application. Combining commercial N and K fertilizer with BL to increase forage production did work. However, it was uneconomical at the BL and commercial fertilizer rates used in this study. More practical rates might be 3 tons BL/acre with about 75 to 100 lb N/acre.

Table 1. Annual ryegrass - Coastal bermudagrass forage production fertilized with 6 tons broiler litter per acre in spring or fall with the addition of N and K fertilizer or clover in 1995.

Treatment	Ryegrass	Clover	Bermuda	Total Forage
	lb/acre			
Spring (S)	2926 c[2]	0 c	6358 ab	9284 c
S+NK[1]	4769 b	0 c	7603 a	12373 b
Fall (F)	5241 b	0 c	4309 d	9550 c
F+NK	7593 a	0 c	6125 bc	13718 ab
Split S,F	4492 b	0 c	4736 cd	9228 c
Split S,F+NK	7190 a	0 c	7498 ab	14689 a
S + clover	2455 c	2959 a	4522 d	9936 c
F + clover	4638 b	1235 b	3542 d	9415 c

[1]NK = 75 lb and 50 lb K_2O/acre after each harvest, annual total 600 lb N and 400 lb K_2O/acre.
[2]Yields in a column followed by the same letter are not significantly different at 0.05 level, Waller-Duncan Multiple Range Test.