RESIDUAL SOIL NUTRIENT LEVELS AFTER APPLYING BROILER LITTER FOR TWO YEARS WITH AND WITHOUT NITROGEN AND POTASSIUM FERTILIZER OR CLOVER

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Background. A study was conducted at the TAMU Agricultural Research and Extension Center at Overton to evaluate management practices that might reduce nutrient buildup in the soil when using BL as the only nutrient source. Six tons of BL were applied in the fall (28 October 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 and nutrient uptake are reported in other articles in this publication. In October 1995, soils were sampled to a 3-ft. depth and divided into 0-6, 6-12, 12-24, and 24-36 in. segments. Soil analysis included nitrates (NO_3), phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg). Only the second year of the 3-year study will be presented in this report.

Research Findings. Only data where there were significant differences among treatments are reported. Nitrate levels were higher at the 0-6 and 6-12 in. depths where N fertilizer was applied (Table 1). These high nitrate levels were due to the large amounts of available N applied from BL (270 lb N/acre) and commercial fertilizer (600 lb N/acre). Average P levels were 31.8 ppm at 0-6 in. and 17.1 ppm at the 6-12 in. depth with no differences among treatments. At the 12-24 in. depth, P levels were lower where clover was planted. Phosphorus levels were low for all treatments at the 24-36 in. depth except spring applied BL plus fertilizer. Differences in K levels were only found at the 12-24 in. depth with the highest levels in the clover treatments. Differences in soil Mg levels were found at all depths except 6-12 in. Magnesium and Ca levels tended to be high in the clover treatments, especially when BL was applied in the spring. Adding clover did decrease bermudagrass production which has a deeper root system than ryegrass or clover, which probably decreased the amount of nutrients removal from lower depths.

Application. After applying BL for 2 years, most of the differences in soil nutrient levels were found at the 12-24 and 24-36 in. depths. Adding clover restricted growth of bermudagrass which has a deeper root system than clover or ryegrass. Potassium, Mg, and Ca were higher and P lower with clover than without clover.

Table 1. Soil nutrient levels after 2 years of broiler litter application with and without nitrogen and potassium fertilizer or clover.

	0-6 in.		6-12 in.	12-24 in.				24-36 in.		
Treatments	NO_3	Mg	NO_3	P	K	Mg	Ca	P	Mg	Ca
	ppm									
Spring (S)	21.1 c[2]	75 b	0.3 c	13.5 a	72 bc	21 c	238 b	2.2 ab	24 c	287 c
S+NK[1]	29.2 a	41 b	17.7 b	11.1 ab	52 c	23 c	348 b	9.2 a	36 bc	395 bc
Fall (F)	0.1 c	77 b	0.1 c	13.9 a	81 bc	30 c	356 b	0.1 b	49 bc	501 bc
F+NK	18.1 b	55 b	13.3 ab	8.1 a-c	99 b	24 c	327 b	4.0 ab	84 b	696 b
Split (F,S)	0.8 c	132 a	0.1 c	8.9 a-c	91 b	24 c	301 b	0.1 b	58 bc	474 bc
F,S-NK	16.5 b	43 b	10.3 b	6.0 a-c	76 bc	20 c	263 b	0.1 b	20 c	276 c
S+clover	0.1 c	143 a	0.1 c	0.1 c	206 a	172 a	1154 a	0.1 b	340 a	1175 a
F+clover	0.9 c	78 b	0.4 c	0.1 c	227 a	143 b	1081 a	0.1 b	353 a	1102 a

[1]NK = 75 lb N and 50 lb K/acre after each harvest, annual total 600 lb N and 400 lb K/acre.

[2]Values within a column followed by the same letter are not significantly different at 0.05 level, Waller-Duncan Multiple Range Test.