

## BROILER LITTER AS AN ALTERNATIVE TO COMMERCIAL FERTILIZER

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**Background.** Broiler litter is a mixture of poultry manure, bedding, feathers, and spilled feed. An estimated 600,000 tons of broiler litter are generated by the broiler industry in Texas each year of which 85% is in East Texas. The average nitrogen (N), phosphorus (P), and potassium (K) content of broiler litter is 62, 59, and 40 lb/ton, respectively. When broiler litter is applied to a pasture, from 60 to 65% of the N is available the first year, about 25 to 30% is lost through ammonia volatilization, and about 10% is not available until after the first year. Essentially all the P and K are available. Broiler litter has several advantages over commercial fertilizer. Animal manure is a complete fertilizer since it contains all nutrients necessary for plant growth. It also is high in organic matter that is a critical part of soil fertility and is an indication of soil quality. As organic matter decays, nutrients are released into the soil over a period of time. This reduces leaching of soluble nutrients like N, sulfur, and boron from the soil during heavy rainfall. Calcium compounds in the manure have a liming effect which reduces soil acidity. Broiler litter can be less expensive than commercial fertilizer. Using the average N, P, and K levels in a ton of broiler litter and the present value of 46¢, 18¢, and 25¢/lb of N, P, and K respectively, a ton of broiler litter has a value of about \$39.02 (Table 1). This does not include the economic value of the other nutrients, liming benefits, and added organic matter.

There are also some disadvantages to broiler litter. Nutrient concentration of broiler litter is variable due to age of the bird, composition of the diet, how the manure is handled, and the number of batches of birds raised since the last clean out. One has to buy broiler litter when ever it is available which may not be the optimum time for fertilizing hay fields or pastures. Broiler litter available in the fall and winter can be applied to winter pasture. Odor problems are due to the release of ammonia, hydrogen sulfide, and other compounds when broiler litter is applied on the pasture surface. Odor problems occur during and after land application until after the first rain. With commercial fertilizer, the exact N, P, and K requirements of a crop can be applied. When applying broiler litter, the nutrient content is variable and unknown. The average N:P ratio of broiler litter is about 1:1. Annual ryegrass and warm-season perennial grasses such as bermudagrass take up N, P, and K in about a 4-1-3 ratio. All N will be utilized but only 1 lb P and 3 lb K will be used for every 4 lb of available N. Based on the nutrients actually removed by the grass, a ton of average poultry litter is now worth only \$27.70 (Table 1). If broiler litter is the only fertilizer used, P builds up in the soil which can lead to environmental problems if it moves into surface water from runoff or erosion. Combining additional N from commercial fertilizer or a

legume with animal manure, will result in plants utilizing the excess P and K and increase the fertilizer value of a ton of poultry litter above \$27.70.

**Recommendations.** When warm-season perennial grasses like bermudagrass and bahiagrass are used for grazing, apply 2 tons/acre of broiler litter every other year and apply about 75 lb/acre of N in years that broiler litter is not applied. An alternative to applying N is to overseed the warm-season grass with a cool-season annual legume each fall as an N source. If fertilizing for 2 hay cuttings, apply 2 tons/acre of broiler litter in the spring and apply about 75 lb/acre of N after the first hay harvest. If 3 to 4 hay cuttings are needed, apply from 3 to 4 tons/acre of broiler litter in spring. After the second hay cutting, apply 75 lb N/acre for the third harvest. After the third harvest, apply 75 lb/acre of N and K for the fourth hay harvest. For small grain-ryegrass pastures, apply 2 tons broiler litter/acre in the fall and 50 lb/acre of N in December. Warm-season pastures that are fertilized with broiler litter should be overseeded each fall with annual ryegrass and/or legumes to utilize nutrients released during the winter from the organic matter during the winter. If cool-season forages are not overseeded, the nutrients release winter will enhance weed growth. Samples of the broiler litter should be analyzed to know how much P is applied and soil samples taken at least every 2 years to monitor soil P levels.

Table 1. Estimated 2006 fertilizer value of broiler litter based on average nutrient content, percent nutrient availability, and nutrient uptake by grass.

Nutrient	Amount	Available	Cost	Value
	lb/ton	lb/ton	¢/lb	\$/ton
Nitrogen (N)	62 (60-65%)	40	46	18.40
Phosphorus (P <sub>2</sub> O <sub>5</sub> )	59 (90-100%)	59	18	10.62
Potash (K <sub>2</sub> O)	40 (90-100%)	40	25	10.00
				\$39.02
4-1-3 Ratio for Bermuda, Bahia, etc.				
Nitrogen (N)		40	46	18.40
Phosphorus (P <sub>2</sub> O <sub>5</sub> )		10	18	1.80
Potash (K <sub>2</sub> O)		30	25	7.50
				\$27.70