



Impact of Poultry Litter Application on Yield and Quality of Alfalfa Grown in Mississippi

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RATIONALE & OBJECTIVES

- Trials were conducted in eastern Mississippi, in 2018 to evaluate alfalfa yield and quality in response to poultry litter (PL) applications.
- Due to poor drainage and excessive weed populations, the Starkville site was abandoned. However, the Newton site experienced great growing conditions throughout 2018 which resulted in five harvests.

STUDY DESCRIPTION

Plot layout:

Randomized complete block design with four replications.

Locations:

Newton and Starkville, MS.

Factors:

Varieties: 'Bulldog 805', 'Bulldog 505', 'Alfagraze 600RR'.

Treatments: 1 and 2 tons PL/acre; positive control (N, P, and K applied at the same nutrient content of the 2 ton/acre PL rate); negative control (P and K applied at the same nutrient content of the 2 ton/acre PL rate).

Analysis:

Forage dry matter (DM) yield, forage quality (NIRS analysis), and stand persistence (crown counts) were determined for each plot at each harvest. Plots were harvested at 30% bloom using a self-propelled plot harvester. All data were analyzed using SAS 9.4 to determine significant differences between varieties and fertilizer treatments.

RESULTS

- Starkville, MS site was abandoned due to poor drainage and weed pressure.
- Five harvests were conducted at Newton location.
- 'Bulldog 505' and 'Alfagraze 600RR' had the greatest cumulative DM yield with 10,512 and 9,464 lb/acre, respectively, through five harvests in 2018 (Table 1).

Table 1. Mean cumulative DM yield (lb/acre) by variety across all fertilizer treatments for 2018 growing season.

Variety	Yield (lb/acre)
Bulldog 505	10512 a*
Bulldog 805	8972 b
Alfagraze 600RR	9464 a

*Lowercase letter denotes significant differences at the $\alpha = 0.05$ probability level.

- No differences in DM yield were found between fertilizer treatments (Table 2).

Table 2. Mean cumulative DM yield (lb/acre) by fertility treatment across all varieties for 2018 growing season.

Variable	Yield (lb/acre)
(1) 1 ton PL/acre*	10030 a**
(2) 2 ton PL/acre*	10013 a
(3) Synthetic N, P, K*†	9791 a
(4) Synthetic P, K*	9296 a

*Applied in split applications; ½ in winter 2017 and ½ approximately 30 d prior to first harvest.

**Lowercase letter denotes significant differences at the $\alpha = 0.05$ probability level.

†Synthetic fertilizers were applied as 33-0-0 for N, 0-46-0 for P, and 0-0-60 for K; amounts used were based on PL analysis and were applied at the same rate as treatment 2.

- Total digestible nutrients (TDN) varied by harvest for each variety; values ranged from 58.2% to 63.2% (Table 3).

Table 3. Mean TDN (%) by variety across all fertilizer treatments for the 2018 growing season.

Variety	TDN (%)				
	Harvest 1	Harvest 2	Harvest 3	Harvest 4	Harvest 5
Bulldog 505	63.2 a*	60.7 a	58.9 a	61.2 a	59.2 a
Bulldog 805	62.9 a	59.8 b	58.5 a	60.0 b	58.2 b
Alfagraze 600RR	63.1 a	59.3 b	57.7 b	60.6 ab	58.9 ab

*Lowercase letter denotes significant differences at the $\alpha = 0.05$ probability level.

- ‘Bulldog 505’ had the lowest seed cost per pound of mean DM yield (Table 4).
- The less expensive PL application is more economical than synthetic fertilizer at these nutrient levels.

Table 4. Seed cost per lb of mean cumulative DM yield (lb/acre) by variety across all fertilizer treatments for 2018 growing season.

Variety	Seed cost per pound of mean DM yield					
	Harvest 1	Harvest 2	Harvest 3	Harvest 4	Harvest 5	Avg. Total
Bulldog 505	\$0.0316	\$0.0483	\$0.0742	\$0.0532	\$0.0595	\$0.0099
Bulldog 805	\$0.0441	\$0.0472	\$0.0782	\$0.0544	\$0.0533	\$0.0107
Alfagraze 600RR	\$0.0745	\$0.1078	\$0.1737	\$0.1267	\$0.1238	\$0.0235

CONCLUSIONS/SUGGESTIONS

- While no differences were observed between fertility treatments for cumulative DM, management decisions should be based on fertilizer costs and availability, and PL nutrient accumulations.
- With successive years of PL applications, special attention should be placed on soil testing to insure nutrients are being removed with hay and are not accumulating in soil profile.
- Bulldog 505 generated the greatest DM yield with the lowest seed cost per pound.
- Forage quality decreases with increasing maturity; late season harvests should take place in a timely manner to prevent the production of poorer quality forage.