

Result Demonstration Report

2009 Soil Fertility Comparison Study in Bermuda Grass Pastures

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Summary:

Fertilizers have been proven to be an effective method to increase forage yields and nutrient value of warm season grasses. Today, there are numerous choices for producers to make when determining what soil fertility to use.

Objective:

The objective of this result demonstration was to compare the different fertilizers for total yield and nutrient value of bermuda grass pastures and the economics of each (lowest cost).

Materials and Methods:

Materials used for this experiment were as follows; Conventional Fertilizer I, Conventional Fertilizer II, Poultry Litter, Poultry Litter plus 50 units of Ammonium Nitrate, Poultry Litter plus 50 units of Urea, Liquid Task Force 2 (11-8-5), Liquid Super Foliar (30-10-10), Parker Organic, Bjork Organic, and Control. The trial was a completely randomized block design replicated three times. Rate for the fertilizers are listed in Table I. The plots were 10 feet wide by 15 feet long. A one foot square was harvested from the plots, weighed and a laboratory analysis performed to determine protein, Acid Detergent Fiber (ADF) and Total Digestible Nutrients (TDN) twenty-eight (28) days after fertilizer application. The plots were harvested three times to simulate three hay cuttings per year. Fertilizer application was conducted one (1) week after each plot harvest.

Table I. Fertilizer and Rates Used in Study

Fertilizer	1st Harvest Rate	2nd Harvest Rate	3rd Harvest Rate
Conventional Fertilizer I (30-0-20)	475 lbs/acre	0 lbs/acre	0 lbs/acre
Conventional Fertilizer II (30-20-20) for 1st and 2nd Harvest. 3rd harvest using 21-0-21	316 lbs/acre	250 lbs/acre	357 lbs/acre of 21-0-21
Poultry Litter	2 tons/acre	0 tons/acre	0 tons/acre
Poultry Litter Plus Urea (50 units of nitrogen)	2 tons/acre poultry litter plus 109 lbs/acre of 46-0-0	109 lbs/acre of 46-0-0	109 lbs/acre of 46-0-0
Poultry Litter Plus Ammonium Nitrate (50 units of nitrogen)	2 tons/acre poultry litter plus 147 lbs/acre of 34-0-0	147 lbs/acre of 34-0-0	147 lbs/acre of 34-0-0
Bjork Organic	Texas Tee 435.6 lbs/acre	Texas Tee 435.6 lbs/acre	Top Organic 435.6 lbs/acre
Parker Organic	30 gallons/acre of product plus 20 gallons of water/acre	30 gallons/acre of product plus 20 gallons of water/acre	30 gallons/acre of product plus 20 gallons of water/acre
Task Force Liquid (11-8-5)	3 quarts/acre	3 quarts/acre	3 quarts/acre
Super Foliar Liquid (30-10-10)	12.5 lbs/acre	12.5 lbs/acre	12.5 lbs/acre
Control	0	0	0

Results and Discussion:

A treatment by date interaction occurred for dry matter of forage produced. There was a significant increase in forage produced for each fertilizer treatment at the July harvest (treatment 3). This increase in forage was due to an increase in rainfall for the month of July (treatment 3). Treatments for May and June harvest were not significantly different for all treatments. July harvest was significantly different from May and June harvests (Table II). May was a very cool month with cool nighttime temperatures which slowed grass growth. June was extremely hot and dry. There was very little soil moisture to promote grass growth. July was very wet and had a significant increase in grass production. The first harvest (May) Conventional I, Poultry Litter plus Urea, Poultry Litter plus Ammonium Nitrate, Bjork Organic, Super Foliar Liquid (30-10-10), and Conventional II were significantly different than Poultry Litter, Parker Organic, Task Force Liquid 11-8-5 and Control at a (P<0.05 level). The second treatment (June), no treatments were significantly different (P<0.05 level) due to the high temperatures and no rainfall. The third treatment (July) Poultry Litter plus Urea, Poultry Litter plus Ammonium Nitrate, Parker Organic, Bjork Organic, Super Foliar (30-10-10) and Conventional II were significantly different (P<0.05) from Conventional I, Poultry Litter, Task Force 11-8-5, and Control.

Table II. Dry matter (lb/acre) of forage produced by treatment. Treatment by date interaction ($P < 0.0001$; SE = 426.72)

Fertilizer	Date		
	May	June	July
Conventional (high)	1673.65 ^{a,b,c}	625.28 ^{ac}	2221.18 ^{b,c}
Poultry LITER	247.33 ^{a,d}	442.31 ^{ac}	1882.61 ^{b,c}
Poultry LITER + 50 units Urea	1032.19 ^{a,c}	1096.40 ^{ac}	3600.83 ^{b,d}
Poultry LITER + 50 units Ammonium Nitrate	753.50 ^{a,c}	515.78 ^{ac}	4057.11 ^{b,d}
Parker Organic	317.92 ^{a,d}	494.17 ^{ac}	4642.48 ^{b,d}
Bjork Organic	1065.18 ^{a,c}	623.84 ^{ac}	5408.09 ^{b,d}
Task Force Liquid (11-8-5)	491.77 ^{a,d}	257.89 ^{ac}	1636.24 ^{b,c}
Super Foliar Liquid (30-10-10)	610.39 ^{a,c}	746.30 ^{ac}	3109.54 ^{b,d}
Control	513.38 ^d	400.52 ^{ac}	1498.80 ^c
Conventional 95-0-65	763.59 ^{a,c}	825.54 ^{ac}	4098.46 ^{b,d}

^{a,b}Rows with different superscripts are significantly ($P < 0.05$) different.

^{c,d}Columns with different superscripts are significantly ($P < 0.05$) different.

Table III: Crude protein (%) of Coastal Bermudagrass. Treatment by date interaction ($P < 0.0001$; SE = 1.74)

Fertilizer	Date		
	May	June	July
Conventional (high)	21.73 ^{b,c}	12.10 ^{a,c}	14.40 ^{a,c}
Poultry LITER	14.80 ^{b,d}	9.43 ^{a,c}	9.77 ^{a,d}
Poultry LITER + 50 units Urea	22.03 ^{b,c}	15.30 ^{a,c}	16.23 ^{a,c}
Poultry LITER + 50 units Ammonium Nitrate	15.23 ^{a,d}	14.70 ^{a,c}	15.77 ^{a,c}
Parker Organic	16.87 ^{b,d}	16.17 ^{b,d}	13.57 ^{a,c}
Bjork Organic	21.0 ^{b,c}	13.47 ^{a,c}	16.57 ^{a,c}
Task Force Liquid (11-8-5)	13.9 ^{a,d}	9.30 ^{a,d}	11.37 ^{a,d}
Super Foliar Liquid(30-10-10)	17.4 ^{b,d}	11.23 ^{a,d}	11.10 ^{a,d}
Control	13.17 ^{b,d}	9.53 ^{a,d}	9.57 ^{a,d}
Conventional 95-0-65	18.33 ^{b,c}	15.97 ^{a,c}	15.13 ^{a,c}

^{a,b}Rows with different superscripts are significantly ($P < 0.05$) different.

^{c,d}Columns with different superscripts are significantly ($P < 0.05$) different.

Table IV: Acid detergent fiber and total digestible nutrients (%) of Coastal Bermudagrass by treatments ($P < 0.0001$; SE = 0.76).

Fertilizer	TDN	ADF
	%	
Conventional (high)	63.34^{a,c}	30.94^{a,c}
Poultry Litter	60.79^b	32.03^a
Poultry Litter + 50 units Urea	64.76^c	29.91^c
Poultry Litter + 50 units Ammonium Nitrate	62.42^a	31.74^{a,c}
Parker Organic	62.41^a	32.44^a
Bjork Organic	62.3^a	32.74^a
Task Force Liquid (11-8-5)	60.50^b	32.52^a
Super Foliar Liquid (30-10-10)	61.11^b	32.52^a
Control	59.18^b	33.87^b
Conventional 95-0-65	63.59^{a,c}	30.83^{a,c}

^{a,b,c} Columns with different superscripts are significantly different ($P < 0.05$)

Table V: Acid detergent fiber and total digestible nutrients (%) of Coastal Bermudagrass by date ($P < 0.001$; SE = 0.42). Three harvest comparison.

Date	TDN	ADF
	%	
May	63.80^a	31.00^a
June	62.68^a	30.24^a
July	59.65^b	34.63^b

^{a,b} Columns with different superscripts are significantly different ($P < 0.0001$)

Table VI: Average Cost per application and Total Cost for Three Applications

<u>Fertilizers</u>	<u>Cost (\$)/ Acre/Treatment</u>	<u>Total Cost for Three Application /Acre</u>
Conventional I	1st Treatment =\$114	\$114
Conventional II	1st Treatment = \$75.84 2nd Treatment = \$18.50 3rd Treatment = \$16.50	\$110
Poultry Litter	\$70	\$70
Poultry Litter Plus Urea (50 units of nitrogen)	1st Treatment Poultry Litter plus Urea =\$91.80 2nd Treatment Urea= \$21.80 3rd Treatment Urea = \$21.80	\$135.40
Poultry Litter Plus Ammonium Nitrate (50 units of nitrogen)	1st Treatment Poultry Litter plus Ammonium Nitrate = \$94.99 2nd Treatment Ammonium Nitrate= \$24.99 3rd Treatment Ammonium Nitrate= \$24.99	\$144.97
Bjork Organic	1st Treatment Texas Tee= 435.6 lbs/acre =\$231 2nd Treatment Texas Tee=435.6 lbs/acre= \$231 3rd Treatment Top Org. = 435.6 lbs/acre =\$182	\$644
Parker Organic	\$30	\$90
Task Force Liquid (11-8-5)	\$13.50	\$40.50
Super Foliar Liquid (30-10-10)	\$14.90	\$44.70

Table VII: Total Yield for all Three Harvest, Tons, Average Protein, and Number of 1000 Pound Bales Produced.

Fertilizer	Total Yield Lbs/Acre (3 harvest)	Total Tons/Acre	Total Bales/acre (1000 lbs)	Average Protein	Cost/Ton
Conventional I	4520.11	2.26	4.5	16.1	\$50.44
Conventional II	5687.59	2.84	5.7	16.5	\$38.85
Poultry Litter	2324.92	1.16	2.3	11.3	\$60.34
Poultry Litter Plus Urea (50 units of nitrogen)	5729.42	2.86	5.7	17.8	\$47.34
Poultry Litter Plus Ammonium Nitrate (50 units of nitrogen)	5326.39	2.66	5.3	15.2	\$54.50
Bjork Organic	7097.11	3.55	7.1	17	\$181.41
Parker Organic	5454.57	2.73	5.5	15.6	\$32.97
Task Force Liquid (11-8-5)	2385.90	1.20	2.4	11.5	\$33.75
Super Foliar Liquid (30-10-10)	4466.23	2.23	4.5	13.2	\$20.04
Control	2412.70	1.2	2.4	10.8	\$0.00

Conclusion:

Fertilizers have been proven as the key to improve forage production. This is the first of the three year result demonstration. In May, it was extremely cool and the forage did not have high enough nighttime temperatures for plant growth. June was extremely hot and dry, which slowed down plant growth. July and the first of August was extremely wet. Our plots had over nine (9) inches of rain during July and the first of August. Yields were very good during this period. Year one data looked very promising. This research project will continue for another two years.

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