Fertilizer Sources on Bermudagrass Pastures for Stocker Grazing

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Findings

- Similar weight gains for stockers grazing bermudagrass were observed over two years among pastures fertilized with either broiler litter or commercial fertilizer.
- Fertilizer costs were reduced by 37% to 41% with the use of broiler litter compared to use of commercial fertilizer.
- A net economic loss resulted in 1999 by retaining calves and stockering over the summer, whereas, in 2000, a net economic return resulted except for one commercial fertilizer source.

Introduction

A high percentage of calves produced in Louisiana are sold at weaning and stockered in other sections of the country. The southeastern United States has an advantage for stocker grazing production over other regions of the nation. Its potential for forage production is higher because of longer growing seasons, adequate rainfall and soils that readily respond to fertilization. These environmental advantages provide livestock producers in Louisiana the opportunity to carry calves through the stocker phase in a profitable manner.

Unfortunately, some major limitations that have hindered stocker grazing are relatively low rates of gain on warm-season forages and relatively high fertilizer costs. Investigation of alternative fertilizer sources will provide valuable information that addresses these limitations.

Usage of broiler litter for fertilizer purposes is expected to increase as broiler production increases in north Louisiana. Broiler litter can usually be obtained for shipping costs alone, so there is a significant economic incentive for producers to use this material as an alternative to commercial fertilizer. Objectives of this study were to determine the effects of broiler litter and commercial fertilizer applied to bermudagrass pastures on animal performance of stocker calves and to compare the economics of these fertilizer sources.

Experimental Procedures

A two-year study was conducted in 1999 and 2000 to determine the effects of broiler litter and commercial fertilizer applied to bermudagrass pastures. Fertilizer source treatments were: 1) 2 tons broiler litter applied in early April and late June (BL-2+2), 2) 4 tons broiler litter applied in early April and 50 pounds per acre nitrogen (N) applied in early July (BL-4), 3) 250 pounds per acre of 17-17-17 (N-P-K) applied in mid-April, mid-May and mid-June, and 50 pounds per acre N applied in early July (CF-30), 4) 250 pounds per acre of 17-17-17 (N-P-K) applied in mid-April, late-May and early July (CF-45). Approximately equal amounts of N (127 pounds per acre) were applied to BL-2+2 and CF-45, and about equal amounts of N (178 pounds per acre) were applied to BL-4 and CF-30.

A total of 156 fall-born, spring-weaned, Angus-sired crossbred calves were used over both years. At the beginning of each trial, calves were given a growth implant (Revalor®, Synovex-H® or Synovex-S®). Replacement heifers used in the study were not given any implant. Eight pastures (two pastures per treatment) were used. The same fertilizer source treatment was assigned in both years to each pasture. Trial lengths were 121 and 112 days in 1999 and 2000, respectively. A stocking rate of 3.5 head/acre (84 head) and 3.0 head/acre (72 head) were maintained in 1999 and 2000, respectively.

Relative forage availability was estimated monthly throughout both trials. Monthly forage clippings were collected to determine forage quality for each pasture over the grazing period. Forage samples were oven-dried, processed and sent to the Forage Quality Laboratory at the Southeast Research Station for analyses.

Results and Discussion

Year effect was significant and overall daily gains for 1999 and 2000 were 1.16 and 1.41 pounds, respectively. Because year effect was significant, the results are reported by year. Reduced stocking rate and greater rainfall amounts in 2000 were the primary factors resulting in improved animal performance in 2000.

Results from this two-year study revealed that similar weight gains of stockers were obtained among the fertilizer source treatments (Tables 1 and 2). Application of more fertilizer (BL-4 and CF-30) resulted in only minimal increases in weight gain compared to treatments with lower amounts of fertilizer applied (BL-2+2 and CF-45).

Fertilizer costs were reduced $11.09/stocker in 1999 (Table 3) and $11.70/stocker in 2000 (Table 4) with the use of broiler litter compared to use of commercial fertilizer. This resulted in reduction in fertilizer costs of 37% to 41% with the use of broiler litter.

There were differences in economic returns among the two years the study was conducted. In 1999, a net loss resulted by retaining calves and stockering over the summer, whereas, in 2000, a net return resulted except for the CF-45 fertilizer source. Lower rates of gain along with hay costs appeared to be the major factors resulting in economic losses in 1999. Because of lower fertilizer costs for the broiler litter treatments, losses were lower in 1999 and returns were higher in 2000 for the broiler litter fertilizer sources.

Forage availability was similar among the fertilizer source treatments over both years. There were no differences in forage crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF) and *in vitro* true digestibility (IVTD) over both years. Seasonal averages for 1999 and 2000 (dry matter basis) for CP, NDF, ADF and IVTD were 18.4%, 67.7%, 31.1% and 69.4%, respectively.

Comparisons of growth implants for daily weight gain indicated a slight advantage, though not significant, for heifers and steers implanted with Revalor® than with Synovex-H® or Synovex-S®. These results were consistent over both years.

Environmental precautions need to be considered with the use of broiler litter as a fertilizer source. Continued use of broiler litter at high rates over a period of several years increases the potential for buildup and runoff of litter compounds that can be harmful to soil and water resources.

Table 1. Weight gain performance of stockers by fertilizer source - year 1999.

Fertilizer source[a]	No. of stockers	Initial weight[b], lb	121-day average daily gain[c], lb	Total gain, lb	Ending weight[b], lb
BL-2+2	21	524	1.09	132	657
BL-4	21	524	1.13	137	661
CF-30	21	525	1.22	148	673
CF-45	21	525	1.18	143	668
P level	--	.98	.95	.95	.94

[a] Fertilizer sources: BL-2+2 - 2 tons/acre of broiler litter applied on April 8 and June 23; BL-4 - 4 tons/acre of broiler litter applied on April 8 and 150 lb/acre of ammonium nitrate applied on July 12; CF-30 - 250 lb/acre of 17-17-17 (N-P-K) applied on April 13, May 13, and June 11, and 150 lb/acre of ammonium nitrate applied on July 12; CF-45 - 250 lb/acre of 17-17-17 (N-P-K) applied on April 13, May 28, and July 12.
[b] 18-hour shrunk weight; average 7% shrink.
[c] Starting trial date - April 13, 1999; ending trial date - August 12, 1999.

Table 2. Weight gain performance of stockers by fertilizer source - year 2000.

Fertilizer source[a]	No. of stockers	Initial weight[b], lb	121-day average daily gain[c], lb	Total gain, lb	Ending weight[b], lb
BL-2+2	18	532	1.43	161	692
BL-4	18	530	1.47	164	693
CF-30	18	530	1.46	164	693
CF-45	18	533	1.28	143	676
P level	--	.85	.88	.87	.94

[a] Fertilizer sources: BL-2+2 - 2 tons/acre of broiler litter applied on April 10 and June 28; BL-4 - 4 tons/acre of broiler litter applied on April 10 and 150 lb/acre of ammonium nitrate applied on July 6; CF-30 - 250 lb/acre of 17-17-17 (N-P-K) applied on April 17, May 17, and June 14, and 150 lb/acre of ammonium nitrate applied on July 11; CF-45 - 250 lb/acre of 17-17-17 (N-P-K) applied on April 17, May 31, and July 11.
[b] 18-hour shrunk weight; average 7% shrink.
[c] Starting trial date - April 18, 2000; ending trial date - August 8, 2000.

Table 3. Economic comparisons of stockers by fertilizer source - year 1999.

Item	Fertilizer Source[a]			
	BL-2+2	BL-4	CF-30	CF-45
	Costs and returns per stocker			
A. Purchase price[b] (@ $.8600/lb), $	468.67	468.67	469.56	469.56
B. Interest on purchase (@ 10% for 5 months), $	19.53	19.53	19.56	19.56
C. Hay costs, $	6.50	6.50	6.50	6.50
D. Fixed costs (corral, fencing, clipping, etc.), $	6.50	6.50	6.50	6.50
E. Labor, vet., minerals, health, etc., $	12.00	12.00	12.00	12.00
F. Fertilizer costs[c] (@ 3.5 head/acre), $	13.69	17.97	29.06	24.78
Total costs (items A-F), $	526.89	531.17	543.18	538.90
Net sales value[b] (@ $.7560/lb), $	504.73	507.81	517.06	513.20
Net returns, $	-22.16	-23.36	-26.12	-25.70

[a] See Table 1 for description of fertilizer sources.
[b] Values based on 3% shrunk weight less commission and beef checkoff where appropriate.
[c] Fertilizer costs based on the following actual costs: broiler litter - $11.98/ton; ammonium nitrate - $199.75/ton; 17-17-17 (N-P-K) - $231.24/ton.

Table 4. Economic comparisons of stockers by fertilizer source - year 2000.

Item	Fertilizer Source[a]			
	BL-2+2	BL-4	CF-30	CF-45
	Costs and returns per stocker			
A. Purchase price[b] (@ $.9600/lb), $	531.15	529.15	529.15	532.15
B. Interest on purchase (@ 10% for 5 months), $	22.13	22.05	22.05	22.17
C. Hay costs, $	0	0	0	0
D. Fixed costs (corral, fencing, clipping, etc.), $	8.70	8.70	8.70	8.70
E. Labor, vet., minerals, health, etc., $	12.00	12.00	12.00	12.00
F. Fertilizer costs[c] (@ 3.0 head/acre), $	17.33	22.39	34.09	29.03
Total costs (items A-F), $	591.31	594.29	605.99	604.05
Net sales value[b] (@ $.8650/lb), $	608.57	609.45	609.45	594.47
Net returns, $	17.26	15.16	3.46	-9.58

[a] See Table 2 for description of fertilizer sources.
[b] Values based on 3% shrunk weight less commission and beef checkoff where appropriate.
[c] Fertilizer costs based on the following actual costs: broiler litter - $13.00/ton; ammonium nitrate - $202.25/ton; 17-17-17 (N-P-K) - $232.25/ton.