Comparison of Input Levels for Upper Gulf Coast Pastures

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Summary

Benefits from introducing new forages, fertilizer, weed control, and livestock supplements are interrelated and must be assessed in a pasture system. Three levels of inputs were evaluated on the poorly drained clay soils at the Angleton Research Station for 3 years. The high input system was established to dallisgrass, fertilized with 150 lbs N/A and 60 lbs P/A, sprayed with a herbicide and had a mineral supplement available. The medium input system was established to dallisgrass and Louisiana S-1 white clover, fertilized with 60 lbs P/A, mowed in late summer for weed control, and had Bloat Guard blocks available for 6 weeks during the peak clover period in spring. The third pasture system was a control and received no inputs. The highest animal gain and lowest cost per pound of calf gain was on the medium input pasture because clover had higher forage quality, extended the grazing season, added nitrogen to the pasture, and provided spring weed control.

Introduction

The profitability of any cow-calf operation is dependent on the cost to produce a pound of calf gain. There are numerous reports from research studies and extension demonstrations on varieties (7, 8), fertilizer (1, 4), clover (2, 3), grazing management (5, 9), etc., but there have been few studies looking at combinations of production inputs in pasture systems. Most production inputs are interrelated. The amount of additional forage produced by applying 75 lbs N/A will depend on the soil type, climate, weed control, and the forage species being fertilized. Realistic assessment of these inputs must be in a long-term grazing system.

Limitations on land, labor, cattle, etc., prevent evaluation of all potential combinations of production inputs. In order to gain some understanding of the benefits of pasture inputs and how they interact under grazing, three levels of production inputs were evaluated for 3 years at the Angleton Research Station.

Procedure

The test site was on a Lake Charles clay which was low in nitrogen and phosphorus, but high in potassium with a pH of 6. Major plant species present were common bermudagrass, dallisgrass, white clover, smutgrass, dewberry, ragweed, and sulfur weed. Size of the high, medium, and no input pastures were 6, 6, and 8.7 acres, respectively. The high and medium input pastures were disked once in fall 1983. In spring 1984 they were disked a second time, smoothed with a field cultivator, and planted to dallisgrass at 6 lbs pure live seed per acre with a Brillion seeder. Four pounds per acre of Louisiana S-1 white clover were planted on the medium input pasture in fall 1984 with a Tye sodseeder. Both pastures received 60 lbs P/A in fall 1984. Establishment costs are listed in Table 1. Estimated costs for land preparation were taken from the 1985 Texas Custom Rates Statistics (10). These costs will vary with location and operator ownership of equipment. Seed costs can also vary from year to year. The control or no input pasture contained a wide range of forages and weeds. Desirable forages were common bermudagrass, dallisgrass, and volunteer clovers. Major undesirable species were smutgrass, ragweed, and dewberries.

All pastures were lightly stocked at one cow-calf pair per two acres from April 12 to August 6, 1985 to allow the dallisgrass stand to thicken up on the high and medium input systems. The high input pasture was sprayed for broadleaf weeds March 13 and was fertilized with 50 lbs N/A on May 21 and August 1, 1985.

TABLE 1. ESTABLISHMENT COSTS FOR THE HIGH AND MEDIUM INPUT PASTURES IN 1983-1984 (EVERS, TAES-ANGLETON)

	Dallisgrass (high input)	Clover-Dallis (medium input)
	cost/acre	
Land preparation discing twice field cultivator	20.00	20.00
Planting	3.00	6.00
Rolling	1.00	1.00
Inoculant		1.00
White clover		11.00 (4 lb @ $2.75)
Dallisgrass	21.00 (6 lb @ $3.50)	21.00 (6 lb @ $3.50)
Total	45.00	60.00

Beginning in fall 1985, the annual fertilization program for the high input system was 60 lbs P/A in the fall and 50 lbs N/A about April 1, June 1, and August 1. A herbicide was applied in the late spring for weed control. The cattle had access to a mineral supplement (12 percent P 12 percent Ca) during the entire grazing season. The medium input pasture of white clover-dallisgrass mixture received an annual fall

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phosphorus application of 60 lbs/A and a single mowing in later summer if needed. Cows and calves had access to poloxalene-molasses blocks for about 6 weeks (early March to mid-April) to prevent bloat.

Continuous grazing at set stocking rates were initiated in 1986 with Hereford-Brahman F_1 cows and Santa Gertrudis cross calves. In 1986 and 1987, fall calving cows and their calves were used from the beginning of the grazing season until early July. At that time they were replaced with spring calving cows and their calves. One set of spring calving cows was used for the entire 1988 grazing season. Four samples per pasture were collected monthly and hand separated to determine botanical composition and estimate forage and weeds present. Pasture and animal production expenses were used to calculate cost per pound of weaned calf.

Results and Discussion

Available Forage

An example of monthly forage and weeds present during the grazing season on the three pasture systems is presented in Table 2 for 1987. Weeds were eliminated from the high input pasture with an application of Grazon P+D on April 9. Ragweed was the major weed at the September 4 sampling. White clover, used in the medium input system, emerges in the fall but generally makes little growth until late February-early March. This permited grazing to begin four to six weeks earlier than on grass only pastures. White clover accounts for a significant part of the forage during the spring but declines to almost nothing with the onset of hot summer temperatures. The solid stand of white clover in the spring also provided control of warm season annual weeds by shading out any weed seed which may have germinated at that time. The amount of weeds in the clover pasture was similar to the high input pasture which was sprayed with a herbicide.

Pasture and Animal Expenses

Costs of production inputs for the three pasture systems are listed in Table 3. Values used for fertilizer and herbicides were the actual costs averaged over the 3 years. Winter feeding expenses were estimated by feeding 1/3 small square bale of hay and 1 lb of cottonseed cubes per day per cow. The cost of a bale of hay will vary depending on forage species and management. Feeding good quality hay would eliminate the need of a protein supplement but would increase the cost of the hay. Expenses for labor, truck, trailer, and maintaining fences and watering facilities are not included.

Animal Performance

Grazing pressure in terms of acres per cow-calf pair was fairly constant within each system (Table 4). The no input system was changed from 2.4 to 2.9 acres per pair because of pasture deterioration due to lack of weed control and fertilization. Grazing season of the clover-grass system (medium input) averaged 36 days longer than the grass only systems which reduced annual animal expenses because of a shorter winter feeding period. Performance of the cows and calves on the clover pasture during March was substantially higher than the cattle remaining on the winter feeding program.

Weight gain per head and average daily gain (ADG) of the cows and calves were always higher on the clover-grass system than either of the grass only systems. Clover is more digestible than grass, and therefore, cows on clover will gain more weight, give more milk, and have better conception rates. Nitrogen fertilizer will increase the amount of forage available per acre, but has only a small influence on forage

TABLE 2. AMOUNT OF GRASS, CLOVER, AND WEEDS PRESENT DURING THE 1987 GRAZING SEASON ON DALLISGRASS PASTURES WITH HIGH, MEDIUM, AND NO INPUTS (EVERS, TAES-ANGLETON)

	150 N-Dallisgrass (high input)		White Clover-Dallisgrass (medium input)				Control (no input)	
	Grass	Weeds	Grass	Clover	Grass+Clover	Weeds	Grass	Weeds
	pounds of dry matter per acre							
March 2			350	1,018	1,368	147		
April 5	579	483	250	1,001	1,251	26	854	293
May 1	737	0	224	518	742	26	733	173
June 4	810	0	746	233	979	47	630	116
July 1	1,061	13	1,156	65	1,221	13	875	138
August 4	1,682	0	2,122	52	2,174	35	1,242	354
September 4	1,419	345	794	17	811	0	414	397
September 30	975	5	1,052	9	1,061	0	664	423
November 4	1,294	17	1,061	26	1,087	0	474	310

TABLE 3. AVERAGE ANNUAL PASTURE AND CATTLE EXPENSES FOR 1986, 1987, AND 1988

	Dallis-150 N (high put)	Clover-Dallis (medium input)	Control (no inputs)
		Pasture Expenses (per acre)	
60 lbs phosphorus ($224/ton)	14.60(24 cents/lb)	14.60(24 cents/lb)	
150 lbs nitrogen (21-0-0 $129/ton)	45.95(31/lb)		
Fertilizer application ($1/A)	3.00(3 times)	1.00(1 time)	
Herbicide (Grazon P+D, $18/gal)	4.50(1 qt.)		
Herbicide application	3.00		
Mowing		5.00(1 time)	
Land rent	10.00	10.00	10.00
Total expenses	81.05	30.60	10.00
		Animal Expenses (per pair)	
Winter feeding period	133 days	98 days	133 days
1/3 bale hay $1.50/bale)	66.50	49.00	66.50
1 lb cottonseed cubes ($233/ton)	15.50	11.42	15.50
Bloat Guard blocks ($640/ton)		7.00	
12-12 minerals ($24/cwt)	6.00		
Fluke vaccines, etc.	10.00	10.00	10.00
Total expenses	98.00	77.76	98.00
		Pasture + Animal Expenses (per pair)	
	187.16	123.66	119.00

TABLE 4. ANIMAL GAIN ON HIGH, MEDIUM, AND NO INPUT PASTURES DURING 1986, 1987, AND 1988

			Cow			Calf			
Year	Acre pair	Grazing period	Gain head	Gain acre	ADG	Gain head	Gain acre	ADG	Cost of calf gain[1]
		days	pounds						¢/lb
			Dallis-150 N (high input)						
1986	1.0	208	68	68	0.33	302	302	1.45	56
1987	1.0	230	166	166	0.72	298	298	1.50	68
1988	1.2	234	118	98	0.50	416	347	2.28	58
Average	1.1	224	117	111	0.52	339	316	1.74	58
			Clover-Dallis (medium input)						
1986	1.5	244	217	145	0.89	413	276	1.69	26
1987	1.5	269	357	238	1.33	439	293	1.84	32
1988	1.5	266	263	175	0.99	526	351	2.45	25
Average	1.5	260	279	186	1.07	459	307	1.99	28
			Control (no inputs)						
1986	2.4	208	94	32	0.45	320	133	1.54	29
1987	2.9	230	161	73	0.70	304	138	1.53	46
1988	2.9	234	149	51	0.64	383	132	2.09	33
Average	2.7	224	135	52	0.60	336	134	1.75	36

[1] Assumes 100% calf crop and does not include expenses for truck, trailer, labor, and maintaining fences and water facilities.

digestibility. Weight gain per head and ADG were similiar for the dallisgrass-nitrogen (high input) and control (no input) systems. But gain per acre for the dallisgrass-nitrogen system was over twice that of the control because there was more forage present and the stocking rate was higher. Calf gain per acre was about the same for the clover-grass and grass-nitrogen systems even though the dallisgrass-nitrogen system was stocked heavier. The higher ADG of cattle on clover and the longer grazing season on the medium input system offset the advantage of the higher stocking rate on the high input (grass-nitrogen) system.

The cost per pound of calf gain was calculated by dividing the animal expenses per pair by the gain per calf. The high input, grass-nitrogen system was always twice as expensive per pair as the medium input, clover-grass system. The low cost of production of the medium input system was due to the lower pasture expenses, higher animal gain, and longer grazing season. The no input or control system was intermediate. However, in this study the pastures were stocked with cow-calf pairs which assumes a 100 percent calf crop on all three systems. Calving percentage of a no input system would probably be around 60 percent and about 90 percent for the other two systems (6). Cost of calf production would be similar for the high and no input systems if a 90 and 60 percent calving rate were used. Calving percentage can vary widely depending on herd management.

This study describes the expected animal performance and cost of production for three levels of inputs on dallisgrass based pastures on the poorly drained clay soils of the Upper Gulf Coast. It demonstrates the economic advantage of a compatible cool season clover and warm season perennial grass that are well adapted for clover species. The best clover-grass combination will vary with soil type and climate. Varieties of bermudagrass and bahiagrass are better adapted to sandy soils. Clover species are more site specific than grasses. The local County Extension agent should be contacted to determine the best adapted varieties for the area. Compatible and persistent clovers have not been identified for all soils.

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