Evaluation of a Year-Round Grazing System: Summer Cow-Calf Progress Report

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Summary

A comparison was made between two different summer grazing systems at the McNay Research Farm. One system was the summer component of a year-round grazing system, involving the rotational stocking of smooth bromegrass-orchardgrass-birdsfoot trefoil pastures and winter stockpile pastures with cow-calf pairs co-grazing with stocker yearlings at .75 animal units per acre. That system was compared with a minimal land system involving the rotational stocking of smooth bromegrass-orchardgrass-birdsfoot trefoil summer pastures with cow-calf pairs grazing at .64 animal units per acre and hay removal from 25% of the pasture. Stocker yearlings or hay removal were used as management tools to remove excess forage and optimize forage quality. Hay was removed once from three fourths of the winter stockpiled pastures in 1996 (Yr. 1) and all the pasture in 1997 (Yr. 2). One hay removal occurred on one fourth of the allocated summer pastures in Year 1 and one half of the pastures in Year 2. In Year one, cow-calf pairs grazing in the year-round system utilized one fourth of the winter stockpile pastures due to a lack of forage on the summer pastures, whereas in Year 2 cow-calf pairs grazed winter stockpile pastures to remove forage as a second cutting of hay. Cow-calf pairs grazing with hay removal were supplemented with harvested hay for two weeks during the summer of Year 1 due to lack of grazable forage; in Year 2, no supplementation was needed. Grazing system did not affect cow body weight, condition score, or daily calf gain in either year. Growing animal production per acre was affected by grazing system, with the minimal land system having a higher production level in Year 1 and Year 2. The year-round system also produced more net winter forage than did the minimal land system in Year 1. Differences in forage yield and quality were only observed between winter stockpile forages of tall fescue-red clover and smooth bromegrass-red clover and summer pastures during the months of June, July, and August.

Introduction

The goals of optimizing the land base and increasing the profitability from cow-calf herds have become increasingly important in recent years. The need to optimize forage utilization and animal productivity has led many to try to increase flexibility in a summer grazing program. This flexibility is often found in a rotational grazing system that incorporates the use of legumes. Because of their ability to fix nitrogen in the soil and their higher nutritive value, legume forage species may increase the yield and quality of the forage produced in pastures while requiring little or no nitrogen fertilization. Rotational grazing is utilized because legumes species may not persist well under continuous grazing conditions. Rotational grazing also offers increased efficiency of forage utilization and productivity, thereby allowing for greater stocking rates.

Hay production during the summer is also an important consideration. Utilization of rotational grazing may allow for hay harvest from summer pastures to control forage growth and provide a source of winter forage or income. An alternative to early season hay harvest is to increase the stocking rate with additional animals, which may be removed when forage density decreases.

The objective of this study was to compare cow body condition score and calf production of cows grazing different stocking systems, utilizing rotational grazing with a hay harvest compared with rotational grazing with yearling stockers and hay harvest from stockpiled hay crop pastures. Changes in the yield and nutritive value of smooth bromegrass-orchardgrass-birdsfoot trefoil pastures and hay, and mixtures of grass-legume-stockpiled forage and hay also were examined.

Materials and Methods

In February of 1996, eight existing ten-acre smooth bromegrass-orchardgrass-birdsfoot trefoil (SB-OG-BT) were frost-seeded with birdsfoot trefoil to re-establish the legume. All pastures were divided into eight paddocks per pasture. On May 1, Yr.1, and May 7, Yr.2, 36 cows were allotted to pastures on the basis of previous winter treatment. Four smooth bromegrass-

Table 1. Year 1 and Year 2 summer sward heights of smooth bromegrass-orchardgrass-birdsfoot trefoil and winter stockpile pastures.

		Month					
		May	June	July	August	September	October
Minimal-land SB-OG-BT	Yr. 1	9.4	11.7[a]	3.5[a]	10.2	10.5	6.2
	Yr. 2	13.4	14.2	9.4	12.4	11.9	6.2
	Average	11.4	12.9	6.5	11.5	11.2	6.2
Year-round SB-OG-BT	Yr. 1	9.2	10.8[a]	11.0[a]	11.6	11.4	5.8
	Yr. 2	11.4	13.5	12.4	13.0	11.4	5.7
	Average	10.3	12.2	11.7	12.3	11.4	5.75
Year-round stockpile	Yr. 1		25.7[b]	25.8[b]			
	Yr. 2		9.2	13.3			
	Average		12.9	12.9			

[a,b] Means in month with different superscripts are significant $p < .05$.

orchardgrass-birdsfoot trefoil pastures were stocked with cow-calf pairs and stocker yearlings (Year-round) at .75 animal units per acre. The remaining four smooth bromegrass-orchardgrass-birdsfoot trefoil pastures were initially stocked with cow-calf pair (Minimal land) at .64 animal units per acre. For the first 41 and 31 days in Yr.1 and Yr.2 of grazing, both grazing systems were moved between paddocks daily to remove rapidly growing forage. Subsequently, cow-calf pairs of the minimal land system were moved between paddocks an average of every five days. Cow-calf pairs in the year-round were moved on June 10 in Yr.1 and June 24 in Yr.2 to four tall fescue-red clover (TF-RC) or smooth bromegrass-red clover (SB-OG) pastures, which had been utilized as winter stockpiled grazing.

In Yr.1, one 3.75-acre paddock of the four stockpiled pastures was strip-stocked for 34 days until hay removal from the remaining 11.25 acres of the stockpiled pastures. After hay removal on July 1, cow-calf pairs were allowed access to all 15 acres until August 6, when they returned to the summer SB-OG-BT pastures. In Yr.2, hay was removed on June 17 from all 15 acres of the stockpiled pastures, cow-calf pairs then strip-grazed all four paddocks for 38 days. On August 1, cow-calf pairs returned to the summer SB-OG-BT pastures. Meanwhile, in both years, yearling stockers remained on the summer SB-OG-BT pastures and were rotated between paddocks on a five-day schedule until August, when yearlings were sent to the feedlot for finishing. In August, all pastures were put on a rotation schedule based on sward height for the remaining grazing season, to remove approximately 33% of the forage.

Cows were bred by natural service over a 60-day breeding season in each year. Cows and calves were weighed and condition scored approximately every 38 days. To estimate forage yield and use, sward heights were measured with a falling plane meter (8.8 pounds per square yard) at two locations per paddock before cows were moved into a paddock and after cows were moved out of each paddock. Forage quantity and quality were determined by hand-clipping a 388-square-inch area in 12 locations in every pasture every 28 days. Production of total amount of forage was determined by hand-clipping two 388-square-inch locations inside and outside an exclosure at 28-day intervals. In June, hay was harvested as large round bales from 3.75 in Yr.1 and 5 acres in Yr.2 of the summer minimal land pastures and 11.75 and 15 acres of the winter stockpiled hay crop pastures. To determine hay yield, all bales were weighed at harvest and six bales from each pasture were core-sampled in four locations.

Results and Discussion

During the first 30 days of grazing, no difference in live forage density was apparent, as estimated by sward heights, between year-round and minimal-land grazing systems in both Yr.1 and Yr.2 (Table 1). Live forage densities differed during the time that year-round system cows grazed either tall fescue-red clover or smooth bromegrass-red clover winter stockpiled pastures in Yr.1. Sward heights on stockpiled pastures increase during this time due to the strip-stocking management, allowing forage to reach maturity during mid-June and July of Yr.1. Forage densities of summer pastures stocked by yearlings on the year-round system or minimal-land system did not differ during the second 60 days of grazing in either Yr.1 or Yr.2.

Monthly forage yield and *in vitro* digestible dry matter (IVDDM) % was not different between SB-OG-BT pastures in the minimal-land or year-round systems (Table 2). In the months of June and July significant differences in forage yield and IVDDM % were observed between SB-OG-BT pastures and winter stockpile pastures of TF-RC and SB-RC. There were no differences observed in crude protein between forage species or grazing systems.

Hay yield in pounds per acre was affected by grazing system in both years. In Yr.1, minimal-land hay production from summer SB-OG-BT pastures was 2,897 lbs. DM/acre compared to 2,269 lbs. Dry Matter/acre (DM/acre) for year-round hay production

Table 2. Monthly forage yield, digestibility, and crude protein of 1996 summer smooth bromegrass-orchardgrass-birdsfoot trefoil pastures and winter stockpile tall fescue-red clover and smooth bromegrass-red clover.

		Month					
		May	June	July	August	September	October
DM yield, lb./ac	Min-land	473.2	1144.6[a]	1082.8	1003.1	1191.9	1205.1
	Yr-rnd	547.3	911.6[a]	1408.2[a]	1426.5	1141.1	1031.9
	Stockpile		2125.1[b]	836.0[b]	990.1		
IVDDM, %	Min-land	61.6	63.4[a]	74.3[a]	58.1	55.9	59.2
	Yr-rnd	63.9	69.0[a]	67.8[a]	61.4	61.5	60.7
	Stockpile		49.5[b]	51.1[b]	56.9		
Crude protein, %	Min-land	15.4	11.5	11.3	15.0	15.4	11.2
	Yr-rnd	15.8	11.9	12.2	13.4	13.3	11.2
	Stockpile		11.8	12.3	13		

[a,b] Means with different superscripts in each month are significantly different $p < .05$.

from winter stockpiled pastures. Yr.2, hay production from minimal-land pastures was 2,018.5 lbs. DM/acre, and 1,386.7 lbs. DM/acre from year-round winter stockpiled pastures. The minimal land system in both years yielded more dry matter pounds per acre for harvested acres and total system. Previous winter results involving winter drylot management for cows indicate that the amount of hay produced from the minimal-land system will be insufficient by approximately one ton.

During the pre-breeding period of the summer cows in both the minimal-land and year-round systems gained body weight in both years (Table 3). Grazing system had no effect on the monthly cow weight change after the pre-breeding period and therefore, no difference in total season body change in either year. No difference in cow body condition was apparent between grazing systems. Both grazing systems caused cows to increase in body condition score throughout the summer in both years. Cow rebreeding rate and calving interval were affected by grazing system. In Yr.1, the minimal-land system had a lower rebreeding rate and longer calving interval, while in Yr.2, the year-round system had a longer calving interval and lower rebreeding rate.

Grazing system year did not affect calf daily gain in either year. Calf gain in pounds per acre was significantly different due to grazing system in both years. This difference is due to the year-round system utilizing 25 acres whereas the minimal-land system utilizes ten acres (Table 4). Yearling daily gains during summer grazing averaged 2.11 lbs./day over two years, resulting in 37.9 lbs./days for the two years. Total grazing growing animal lbs./acre was affected by grazing system in both years because of the greater number of acres utilized by the year-round grazing system.

Implications

Use of a larger land area allows for the incorporation of stocker yearlings to help maintain a desirable sward height, and forage quality and to increase the growing animal pounds per acre of production. The larger land areas allow for a greater flexibility in mid-summer when forage growth may be reduced. Hay production by the minimal-land system may be inadequate for winter management of cows in drylot, necessitating the addition of stored feeds.

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Table 3. Two year mean cow body weight and body condition score changes of Minimal-land and Year-round management systems.

	Forage System					
	Minimal-land System			Year-round System		
	Year 1	Year 2	Average	Year 1	Year 2	Average
Body weight, lbs.						
Initial	1119	1144	1132	1135	1083	1109
Season change						
Pre-breeding	26	50	38	35	89	62
Breeding	15	4	9.5	-14	6	-4
Post-breeding	26	37	32	33	16	25
Total	67	91	79	54	111	83
Body condition score [e]						
Initial	4.2[a]	4.7	4.45	4.8[a]	5.1	
Season change						
Pre-breeding	.7	.6	.65	.5	.6	.55
Breeding	.4[a]	0	.2	.1[b]	-.1	0
Post-breeding	.3[c]	.8	.55	-.3[d]	1.0	.4
Total	1.4[c]	1.4	1.4	.3[d]	1.5	.9
Calving interval	376[c]	370	373	361[d]	374	368

[a,b] Differences between means with different superscripts are significant $p < .1$.
[c,d] Differences between means with different superscripts are significant $p < .05$.
[e] 9 point scale

Table 4. Growing animal and hay production from Minimal-land or Year-round management systems.

	Forage System					
	Minimal-land System			Year-round System		
	Year 1	Year 2	Average	Year 1	Year 2	Average
Calf gain						
Lb./day	2.63	2.51	2.57	2.57	2.38	2.48
Lb./acre	167.7[a]	172.9[a]	170.3[a]	80.9[b]	82.9[b]	81.9[b]
Yearling gain						
Winter	.51	n/a	.51	.49	.38	.44
Summer grazing	n/a	n/a	n/a	1.92	2.29	2.11
Feedlot	4.05	3.52	3.79	4.14		
Lb./acre	n/a	n/a	n/a	37.6	38.3	37.97
Growing animal lb./ac	167.7[a]	172.9[a]	170.3[a]	118.5[b]	121.2[b]	119.9[b]
Hay yield, lbs. DM/ac						
Harvested acres	2,896[a]	2,018	2,457	2,269	1,387	1,828
Total system	1,086[a]	1,009	1,047	1,021[b]	832	927
Net total winter forage	875.7[a]	1,009	942	2,834[b]		

[a,b] Differences between means with different superscripts are significant $p < .05$.