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LIVEWEIGHT GAINS OF WEANED CALVES FROM FOUR LEVELS OF AVAILABLE FORAGE

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SUMMARY

Coastal bermudagrass was overseeded with 'Marshall' ryegrass and 'Mt. Barker' subterranean clover and continuous grazing initiated with five weaned, crossbred calves at each of four levels of forage availability which, in turn, produced four different stocking rates. Levels of available forage ranged from excessive quantities (>100 pounds forage dry matter per 100 pounds animal body weight) to severely restricted ad libitum intakes (<15 lbs DM/100 lbs BW). Final stocking rates, based on 600-pound calf equivalent, were 3.9, low (L); 5.0 medium low (ML); 6.5, medium high (MH); and 9.7 animals per acre, high (H). Average daily gains for the 212-day trial were 1.75, 1.45, 1.20, and 0.51 pounds per head per day, respectively for L, ML, MH, and H. Gain per acre was 1451, 1545, 1651, and 1067 pounds, respectively for L, ML, MH, and H.

INTRODUCTION

Management decisions which surround a summer grazing period are generally concerned with gains per animal-gain per acre relationships. Selection of the "proper" stocking rate or grazing pressure is critical to the economic stability of the grazing program. This trial was therefore initiated to ascertain the influence of four levels of forage availability on liveweight gains of weaned steers and heifers.

PROCEDURE

Pastures used were Coastal bermudagrass oversown with 'Marshall' ryegrass and subterranean clover. A total of 250-100-100 lbs/ac of N-P₂O₅-K₂O was split-applied from October 1982 (at planting) until August 1983. Grazing was continuous during the 212-day trial from March 1, 1983 until September 29, 1983. Three steers and two heifers (Brangus and Brahman-Simmental crosses) were allotted to each of the four pastures. Heifers weighed approximately 400 lbs and steers weighed approximately 460 lbs at initiation of the trial. The calves were approximately 8 months of age at the beginning of the trial and had received small grain-ryegrass pastures prior to March 1. In

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addition to the weaned calves, F-1 (Brahman x Hereford) cows and their Simmental-sired calves, and two fistulated Brahman steers occupied each pasture. Cattle were weighed at about 28-day intervals and average daily gains for both steers and heifers are reported. The total liveweight which occupied each pasture, including all classes of cattle, was used to estimate the stocking rate on a weaned calf basis. A weaned-calf equivalent was estimated to be 600 lbs. Thus, stocking rates were calculated by dividing the liveweight per acre by 600. It is recognized that stocking rate may be determined in several ways, but this calf-equivalent estimate was considered to be a reasonable method.

Pastures were sampled at monthly intervals to ground level to determine forage available for consumption. Forage quality samples were taken every two weeks by hand-clipping areas which visually represented the animals selectivity.

RESULTS AND DISCUSSION

Table 1 shows the level of available forage at monthly intervals throughout the trial period for each of the four grazing pressure treatments. With the exception of the late May, early June period, the ratio of forage dry matter per 100 lbs animal body weight was approximately 100 or greater at the low stocking rate. The combination of cool night-time temperatures, which slowed bermudagrass growth, and the failure to remove regulator cattle from the pastures caused a temporary decline in forage availability. Otherwise, forage availability never limited ad libitum intake at the low stocking rate. On the other hand, cattle on the high stocking rate were limited in their ability to fill. Note the apparent rapidity of bermudagrass growth at the low stocking rate during the last two months of the trial in contrast to the growth rate from other stocking rate pastures.

The monthly and total trial steer and heifer gains from the low stocked pasture is presented in Table 2. Of primary interest is the decline in average daily gain (ADG) of both steers and heifers with season of the year. Since the quantity of forage was never limiting ad libitum intake, a combination of several factors, notably forage quality decline and increased temperatures, were responsible for the rapid decrease in liveweight gains. Note that as temperatures declined in the fall (9-7 to 9-29) forage quality improved and animal gains increased. Also of particular interest is the absolute rate of gain achieved by these calves. Admittedly, there were some compensatory gains occurring in these predominantly summer-born calves, but the 1.82 ADG for the steers and 1.64 ADG for the heifers was considerably higher than previous grazing trials conducted during similar periods of time. The average for both sexes, 1.75 lbs/hd/day, was represented by 372 lbs of gain per animal during the 212 day trial. By using 600 lbs as one calf equivalent, the average stocking rate was calculated to be nearly 4 calves per acre at the low stocking rate.

At the medium low stocking rate (Table 3), the influence of lack of available forage was evident in the decline in ADG. There was a .35 lb/hd/day decrease from the low stocking rate ADG of 1.75 to 1.45 at the medium low stocking rate. Steers continued to gain more than heifers by about 20%. As the stocking rate increased from 3.9 to 5.0 animals per acre, the average calf gain for the trial declined from 372 lbs to 309 lbs. However, the steer ADG of 1.58 for the duration of the trial are impressive, and especially in the light of 5 calves per acre.

Table 4 illustrates the steady decrease in individual animal performance with an increase in stocking rate or grazing pressure. The calculated stocking rate of 6.5 calf-equivalents per acre or 3900 lbs of liveweight per acre produced the range of ADG which are more commonly found in these types of trials. By further estimating gain per acre of a pasture comprised of only steers, the projections calculate to an enormous 1801 pounds per acre (6.5 animals/acre x 1.3 lbs/hd/day x 212 days). Although the method of estimating stocking rate by using 600 lbs as a calf equivalent may be in error, the fact that Coastal bermudagrass accommodated an average of nearly 4000 lbs of animal body weight per acre and continued to yield respectable steer gains of 1.3 and heifer gains of 1.04 lbs/hd/day is of significant economic importance.

As stocking rates were increased to levels which severely restricted ad libitum intake, calf gains were rapidly and severely depressed during the latter stages of the trial (Table 5). Total animal liveweight per acre of 5760 lbs was approximated to represent nearly 10 calves per acre. At this stocking rate, an average of both steer and heifer gains resulted in only 110 lbs per animal or an ADG of .51 for the trial. Due primarily to the animal performance during the last weigh period, heifers had a higher trial ADG than did steers (.62 vs .44). At this level of stocking, both gain per animal and gain per acre were depressed as compared to the previous stocking rate.

Table 6 presents a summary of gain per animal and gain per acre. The gain per acre for each sex of calf at each stocking rate is not additive, but rather is presented as if the pasture was comprised only of that sex, or in the case of "calf", a mixture of both sexes of calves. Again, the potential of compensatory gain may have been high with this set of calves; however, they were not abnormally thin at initiation of the trial (body condition score estimated at 5). These gains do, however, indicate the potential gains which can be achieved from Coastal bermudagrass based pastures and Brahman crossbred calves which have adequate age and frame size for rapid growth.

The most important factors which must be considered in grazing stocker-type cattle on warm-season perennial grass pastures such as Coastal bermudagrass are: (1) The level or amount of forage available for consumption directly controls rate of gain on a per animal basis (ADG). In other words, one must know "how to graze" Coastal bermudagrass before optimum or maximum animal performance can be obtained; (2) The breed (percent of Brahman influence), age, and frame

size are critical to achieving acceptable gains during the hot summer periods. Calves which are 8 to 12 months of age and which weigh 200 to 300 pounds less than their frame size would indicate are excellent prospects because of their ability to make compensatory gains during the bermudagrass stage; (3) Overseeded bermudagrass (ryegrass and clover) contributes significantly to alleviating health problems and reducing death loss and increases the initial rates of gain. From one-third to one-half the gains will occur during that period in which the winter annual forages are completing their growth and bermudagrass is initiating its growth (March, April, and May).

The grazing of stocker-type cattle during the spring-summer-fall months can offer a good economic incentive. By assigning an average gain value of 50 cents per pound, the gross income from 1400 to 1600 pounds of gain per acre rapidly accelerates to some very encouraging numbers (\$700 to \$800 per acre). However, before this venture is executed, all costs including potential negative margins should be carefully analyzed, and an understanding of some of the relationships between gain per animal and gain per acre as affected by available forage should be appreciated.

TABLE 1. AVAILABLE FORAGE AT FOUR STOCKING RATES

Date	LOW			MEDIUM LOW			MEDIUM HIGH			HIGH		
	lb DM/ac ¹	lb DM ²		lb DM/ac	lb DM		lb DM/ac	lb DM		lb DM/ac	lb DM	
		100	1b BW		100	1b BW		100	1b BW		100	1b BW
Feb. 24	3206	-	-	3331	-	-	2755	-	-	2880	-	-
March 14	2381	147		1603	59		1978	73		1037	28	
April 13	2119	116		1185	68		1625	54		780	20	
June 1	1046	49		1267	38		547	16		317	7	
June 30	2899	114		1526	37		1488	37		922	14	
July 27	2698	89		2304	63		1661	32		1046	12	
August 31	7085	247		3235	95		1978	38		298	4	
Sept. 26	6739	229		2448	76		912	19		86	1.3	
AVG	3522	142		2112	62		1618	38		921	12	

¹Pounds of forage dry matter per acre harvested to ground level.²Pounds of forage dry matter per 100 pounds of animal body weight.

TABLE 2. LIVELWEIGHT PERFORMANCE FROM WEANED CALVES GRAZING AT A LOW STOCKING RATE

Period	No. Days	AVERAGE DAILY GAIN			Calf Averages		
		Heifer	Steer	Calf	Period Gain/An (lbs)	Grazing ¹ Pressure Per Acre (lbs/ac)	Stocking Rate ² (An/Ac)
3-1 to 3-29	28	3.03	3.09	3.07	86	1618	2.7
3-29 to 5-12	55	1.36	1.95	1.72	95	1831	3.1
5-12 to 6-16	24	2.18	2.26	2.23	54	2123	3.5
6-16 to 7-12	26	1.61	1.51	1.55	40	2549	4.2
7-12 to 8-10	29	1.03	1.06	1.05	30	3016	5.0
8-10 to 9-7	28	.98	.85	.90	25	2870	4.8
9-7 to 9-29	22	1.65	2.15	1.95	43	2940	4.9
TOTALS/AVG	212	1.64	1.82	1.75	372	2340	3.9

TABLE 3. LIVELWEIGHT PERFORMANCE FROM WEANED CALVES GRAZING AT A MEDIUM LOW STOCKING RATE

Period	No. Days	AVERAGE DAILY GAIN			Calf Averages		
		Heifer	Steer	Calf	Period Gain/An (lbs)	Grazing ¹ Pressure Per acre (lbs/ac)	Stocking Rate ² (An/ac)
3-1 to 3-29	28	3.21	2.66	2.88	81	2705	4.5
3-29 to 5-23	55	1.30	1.32	1.31	72	1753	2.9
5-23 to 6-16	24	1.41	2.44	2.03	49	3365	5.6
6-16 to 7-12	26	0.90	1.55	1.29	34	4096	6.8
7-12 to 8-10	29	.56	1.33	1.02	30	3666	6.1
8-10 to 9-7	28	1.17	.94	1.03	29	3406	5.7
9-7 to 9-29	22	-.02	1.12	.66	15	3215	5.4
TOTALS/AVG	212	1.26	1.58	1.45	309	3000	5.0

¹Grazing pressure per acre represents total liveweight of weaned calves and cow-calf pairs which were occupying this particular pasture.

²Stocking rate based on 600 lbs grazing pressure equivalent to one calf.

TABLE 4. LIVELWEIGHT PERFORMANCE OF WEANED CALVES GRAZING AT A MEDIUM HIGH STOCKING RATE

Period	No. Days	AVERAGE DAILY GAIN			Calf Averages		
		Heifer (lbs)	Steer (lbs)	Calf (lbs)	Period Gain/An (lbs)	Grazing ¹	
						Pressure Per Acre (lbs/ac)	Stocking Rate ² (An/ac)
3-1 to 3-29	28	3.19	2.86	3.0	84	2705	4.5
3-29 to 5-23	55	0.67	1.53	1.18	65	2982	5.0
5-23 to 6-16	24	1.27	1.34	1.31	31	3349	5.6
6-16 to 7-12	26	1.28	1.91	1.66	43	4013	6.7
7-12 to 8-10	29	0.74	0.01	0.30	9	5172	8.6
8-10 to 9-7	28	0.71	0.47	0.57	16	5142	8.6
9-7 to 9-29	22	-.50	0.75	.25	6	4857	8.1
TOTALS/AVG	212	1.04	1.30	1.20	254	3900	6.5

TABLE 5. LIVELWEIGHT PERFORMANCE OF WEANED CALVES GRAZING AT A HIGH STOCKING RATE

Period	No. Days	AVERAGE DAILY GAIN			Calf Averages		
		Heifer (lbs)	Steer (lbs)	Calf (lbs)	Period Gain/An (lbs)	Grazing ¹	
						Pressure Per Acre (lbs/ac)	Stocking Rate ² (An/ac)
3-1 to 3-29	28	2.16	2.57	2.40	67	3698	6.2
3-29 to 5-23	55	0.25	.19	.21	12	3890	6.5
5-23 to 6-16	24	1.08	1.33	1.23	30	4547	7.6
6-16 to 7-12	26	1.05	0.62	0.80	21	6590	11.0
7-12 to 8-10	29	-.58	-.64	-.62	-18	8608	14.0
8-10 to 9-7	28	-.23	.13	-.01	-.30	8270	13.8
9-7 to 9-29	22	1.31	-1.00	-.07	-2	6875	11.5
TOTALS/AVG	212	.62	.44	.51	110	5760	9.7

¹Grazing pressure per acre represents total liveweight of weaned calves and cow-calf pairs which were occupying this particular pasture.

²Stocking rate based on 600 lbs grazing pressure equivalent to one calf.

TABLE 6. GAIN PER ANIMAL AND GAIN PER ACRE OF STEERS AND HEIFERS GRAZED AT FOUR STOCKING RATES

ITEM	LOW STOCKED			MEDIUM LOW STOCKED			MEDIUM HIGH STOCKED			HIGH STOCKED		
	Heifer	Steer	Calf	Heifer	Steer	Calf	Heifer	Steer	Calf	Heifer	Steer	Calf
Initiation		3-1-83			3-1-83			3-1-83			3-1-83	
Termination		9-29-83			9-29-83			9-29-83			9-29-83	
No. Days		212			212			212			212	
Initial wt. (lbs)	413	460	441	399	456	433	397	465	438	401	468	441
Termination wt (lbs)	762	847	813	667	793	742	618	742	692	534	562	551
Trial Gain (lbs)	349	387	372	268	337	309	221	277	254	133	94	110
Trial ADG (lbs)	1.64	1.82	1.75	1.26	1.58	1.45	1.04	1.30	1.2	0.62	0.44	.51
Stocking Rate ¹ (An/ac)	-----	3.9	-----	-----	5.0	-----	-----	6.5	-----	-----	9.7	-----
Gain/acre (lbs)	1361	1509	1451	1340	1685	1545	1437	1801	1651	1290	912	1067

¹Stocking rate calculated using total pounds liveweight per acre divided by 600 lbs per animal.