INFLUENCE OF WINTER GROWING PROGRAM AND SUMMER GRAZING PROGRAM ON PERFORMANCE OF HEIFERS GRAZING TALLGRASS PRAIRIE

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Story in Brief

Beef heifers were backgrounded for 42 days on either dormant range plus protein cubes or limit-fed a high concentrate ration in drylot to gain 1.0, 1.5 or 2.0 lb/head/day. On May 1 after backgrounding, the heifers were allocated to either 150 day seasonlong grazing or 80 day intensive-early stocking programs. Weight gain on range during the backgrounding phase was .27 lb/day. The three limit-fed groups gained 1.09, 1.91, and 2.15 lb/day, respectively. Because of poor forage growing conditions, weight gains during the summer were low relative to past years and stocking was too heavy on the intensive-early stocking treatment. Cattle backgrounded on range gained more weight than cattle previously fed concentrate diets. During the first 80 days of grazing, total weight gain by intensive-early stocking heifers was depressed .31 lb for each pound of additional weight gained during the winter while weight gain of seasonlong grazing heifers was depressed .47 lb/lb of additional winter gain. Over the 150 day season, gain of the seasonlong grazing heifers was depressed .56 lb/lb of additional winter gain. As a result of poor performance in the early grazing season, the intensive-early stocking system did not produce more gain per acre than the seasonlong grazing system.

(Key Words: Grazing Systems, Rangeland, Compensatory Gain.)

Introduction

Many wintering programs for stocker cattle are intended to hold cattle at low rates of gain, therefore preparing them for compensatory gains on summer pastures. Although wintering at higher rates of gain may reduce subsequent summer performance, total weight gain and profitability may be improved by accelerated gains during the wintering phase.

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Limit-feeding high concentrate rations for a programmed rate of gain is a predictable means of improving winter performance. The relationship between rate of gain in the winter and gain in the grazing phase must be understood in order to project economies of different management programs. Results from a previous trial (McLean et al., 1990) indicated that for each additional pound of daily gain prior to grazing, daily gain on grass was depressed between .33 and .49 lb depending upon the length of the grazing season.

Intensive-early stocking is a grazing program which can increase weight gain per unit land area by 20-40% compared to seasonlong grazing. This is accomplished by shortening the summer grazing season by about one-half and increasing stocking density two or three times normal. Previous results indicate that plane of winter nutrition had a greater impact on daily gain during the intensive early stocking period than on gains over a full summer grazing season (McLean et al., 1990).

The current results are from the second year of a study conducted to determine the effects of accelerated winter gains on the performance of stocker cattle grazed under two different grazing programs. Subsequent feedlot performance was also monitored and is reported in accompanying reports.

Materials and Methods

One hundred sixty head of crossbred heifer calves (initial wt = 468 lb) were purchased in Georgia and transported to the Pawhuska Research Station in February, 1990. Following routine processing and a short receiving period, the heifers were allocated to two replications of four winter nutritional management programs. Replications were based on truckloads delivered to the station. One treatment group (DW) was placed on dormant tallgrass prairie rangeland and fed 2.0 lb/head/day of 38% CP range cubes. Salt/mineral mix was provided free-choice. The other three groups were confined in drylot and limit-fed a high concentrate diet (Table 1) in sufficient quantities to promote 1.0 (LG), 1.5 (MG), or 2.0 (HG) lb gain/head/day. Daily feed allowances were based on estimated NE_g content of the ration and energy requirements of the heifers. Feed allowances were adjusted every 14 days based on projected gains of the cattle. Feed was offered once daily between 9 a.m. and 10 a.m. All heifers were implanted with Synovex-H at the start of the winter period and reimplanted at 84-day intervals until trial completion.

After 42 days on the winter nutritional programs, the cattle were weighed following an overnight period without feed and water. Each winter treatment replication was then randomly allocated by weight to either

Table 1. Composition of limit-fed ration.

Ingredient	% As fed
Corn, #2 whole shelled	86.96
Supplement	13.04
Supplement composition	
Soybean meal	51.18
Cottonseed meal	29.83
Calcium carbonate	9.96
Potassium chloride	2.06
Salt	2.45
Dicalcium phosphate	.59
Urea	3.46
Tylan 40	.09
Vitamin A-30	.17
Vitamin E-50	.014
Rumensin 60	.19

intensive-early stocking (IES) or seasonlong stocking (SLS) for the summer grazing season. Seasonlong stocking is continuous grazing from May to late September at the recommended moderate stocking rate. Intensive-early stocking is defined as continuous grazing from May to mid July at a stock density (head/acre) twice that of the SLS but at a stocking rate (head•days/acre) similar to SLS. Four pastures, two IES and two SLS, were used for the grazing phase. Rangeland on the research station is typical of the Cross Timbers vegetation type with a mosaic of oak/hickory forests and tallgrass prairies.

On July 20, 80 days into the summer grazing season, all cattle were weighed following an overnight period without feed and water. The SLS cattle were returned to pasture and the IES groups were transported 310 miles to Goodwell, OK, to be finished. The SLS cattle were grazed for an additional 70 days (150 days total) before being shipped to the same location for finishing. Protein supplement (1.0 lb/head/day, 38% CP range cubes) was fed to the SLS cattle during the final 70 days of grazing. Weights were recorded prior to shipment in September.

Data were analyzed using GLM procedures of SAS. The model for the backgrounding phase and last 70 days of the SLS phase included winter treatment and replication. Comparisons for the first 80 days of the grazing season were made using a model containing winter treatment, grazing

treatment, replication, and the interaction of winter treatment and grazing treatment. Least significant difference procedures were used to separate means. Separate regression equations for the relationships of winter gain and grazing gain were developed for the IES cattle and SLS cattle during the first 80 days, and SLS cattle for the complete 150 days of grazing.

Results and Discussion

Winter nutritional management resulted in an 80 lb spread in average weights between the DW heifers and the HG heifers (Table 2). All the program fed heifers were more efficient than expected with the actual feed conversion being 21 percent better than expected at the MG feeding level. DW heifers gained less ($P<.05$) weight than the other groups. The previous year, DW heifers gained .95 lb/day during an 84-day winter period (McLean et al., 1990). The LG and HG groups performed relatively close to programmed levels of gain. The MG group gained .41 lb/day more than targeted and weight at the end of the winter phase was similar to weight of the HG heifers. During the previous winter trial, daily gains of all three

Table 2. Performance of heifers during the 42-day winter phase.

	Dormant range	Programmed gain, lb/day		
		1.0	1.5	2.0
	lb/head			
Initial weight	467	471	467	468
Final weight	479[a]	517[b]	547[c]	559[c]
Gain	11.3[a]	45.8[b]	80.1[c]	90.2[c]
Daily gain	.27[a]	1.09[b]	1.91[c]	2.15[c]
Feed intake (dry matter basis)		7.4	9.1	10.9
Feed/gain				
Theoretical	---	7.4	6.1	5.4
Actual	---	6.8	4.8	5.1

[a,b,c] Row means are different, $P<.05$.

limit-fed groups were about .50 lb/head/day greater than expected (McLean et al., 1990).

Weight gains on pasture were low relative to several previous years of research at this station. During the first 80 days of grazing, the heifers on IES gained less weight than heifers on SLS (Table 3). This depression indicates that stocking rates were too heavy. Pasture utilization was grossly surveyed in July. Use profiles on key grass species did not suggest overutilization. However, a canopy of lanceleaf ragweed was present in the pastures and may have inhibited grazing by cattle. Additionally, the spring of 1990 was relatively cool and dry and forage production was effectively delayed by three to four weeks.

Heifer performance during the initial 80 days of grazing is summarized in Table 3. No interactions among winter treatments and summer grazing

Table 3. Performance of heifers during the first 80 days of grazing.

	Dormant range	Programmed gain, lb/day		
		1.0	1.5	2.0
	lb/head			
Initial weight				
IES[d]	476	520	545	556
SLS[d]	481	513	550	561
80-day weight				
IES[d]	558	590	597	606
SLS[d]	595	606	620	622
MEAN	576[a]	598[b]	608[b]	615[b]
Gain				
IES[d]	82.3	69.9	52.7	50.9
SLS[d]	113.4	93.2	69.8	60.9
MEAN	97.9[a]	81.5[b]	61.2[c]	55.9[c]
Daily gain				
IES[d]	1.03	.87	.66	.64
SLS[d]	1.42	1.17	.87	.76
MEAN	1.22[a]	1.02[b]	.76[b]	.70[b]

[a,b,c] Row means are different, $P < .05$.

[d] IES = Intensive-early stocking; SLS = Seasonlong stocking.

programs were noted. Cattle from the DW treatment gained more ($P<.05$) weight than heifers from the programmed feeding groups. By the end of 80 days on pasture, the range in weights between the DW and HG heifers had narrowed from 80 lb/head to 50 lb/head on IES and 27 lb/head on SLS. Once again, the gains for the MG and HG heifers were similar. Performance of the LG heifers was intermediate to the DW group and the two higher levels of programmed gain.

Weight gain during the final 70 days of the SLS grazing period were similar for the four winter management groups (Table 4). In a previous trial (McLean et al., 1990), the DW and LG cattle tended ($P=.08$) to gain faster than the MG and HG cattle in the late summer. The current results failed to show such a trend ($P=.19$).

Heifers on IES gained less weight ($P<.05$) than heifers on SLS during the first 80 days of grazing (Table 3). Regression equations relating winter daily gain (X) to daily gain (ADG) during the first 80 days of grazing were: $ADG=1.02-.16X$ ($P<.0001$; $r^2=.25$) for IES heifers and $ADG=1.39-.25X$ ($P<.0001$; $r^2=.32$) for SLS heifers. Hence for IES heifers, each additional pound of daily gain in the winter depressed daily gain on pasture by .16 lb/day. On SLS, daily gain was depressed .25 lb/day. Similar equations relating total winter gain (X) to total gain (GAIN) in the first 80 days were: $GAIN=81.8-.31X$ for IES and $GAIN=111.1-.47X$ for SLS. This second set of equations is more useful and indicates that for every pound of additional gain in the winter, gain by the IES heifers was depressed .31 lb while gain was depressed almost .5 lb in the SLS heifers. In year 1, GAIN depression during the first 84 days of grazing was .49 lb/lb of additional winter gain (McLean et al., 1990).

The difference in gain suppression between IES and SLS indicates that heavy stocking reduced the ability of the DW and LG heifers to compensate as fully on IES as on SLS. This suggests that winter management programs

Table 4. Effects of winter growing program on performance of heifers during the last 70 days of summer grazing.

	Dormant range	Programmed gain, lb/day		
		1.0	1.5	2.0
	lb/head			
Final weight	663	677	678	682
Gain	68.0	70.9	57.5	60.2
Daily gain	.97	1.01	.82	.86

which accelerate gain will have less impact in operations that utilize grazing management programs that depress performance (i.e. heavier stocking or possibly intensive rotation) than in grazing programs which promote high cattle gains (i.e. continuous grazing at moderate stocking rates).

Regression analysis for the entire SLS grazing season yielded the equations ADG=1.20-.16X ($P<.0001$; $r^2=.32$) and GAIN=180.3-.56X. In year 1, SLS GAIN was depressed .60 lb/lb of winter gain.

SLS heifers were 87 lb heavier ($P<.05$) than IES heifers at the end of their respective grazing seasons (Table 5). Also, the spread between winter management groups was 49 lb/head and 19 lb/head for IES and SLS cattle, respectively.

In past research at this station (McCollum et al., 1990), IES produced about 20% more gain/acre than SLS grazing. However, due to poor performance during the early grazing season, IES yielded 14% less ($P<.05$) gain/acre than SLS in the current year (Table 5). No interaction between winter management and summer grazing system was detected. Gross differences between IES and SLS ranged from 17 to 25 lb gain/unit area for the winter management groups.

Table 5. Total gain/heifer, total gain/area, and weight off pasture.

	Dormant range	Programmed gain, lb/day 1.0	1.5	2.0
	lb/head			
Weight off pasture				
IES[d]	558	590	597	607
SLS[d]	663	677	678	682
Mean	610[a]	634[b]	637[b]	645[b]
Total gain/heifer				
IES[d]	82.3	69.9	52.6	50.9
SLS[d]	181.4	164.1	127.3	121.2
MEAN	131.9[a]	117.0[b]	89.9[b]	86.0[b]
Total gain/acre				
IES[d]	164.7	139.8	105.3	101.8
SLS[d]	181.4	164.6	127.2	121.1
MEAN	173.0[a]	151.9[b]	116.3[c]	111.5[c]

[a,b,c] Row means are different, $P<.05$.
[d] IES = Intensive-early stocking; SLS = Seasonlong stocking.

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