EFFECTS OF WINTER FEEDING AND SUMMER GRAZING PROGRAMS ON FEEDLOT PERFORMANCE AND CARCASS MERIT OF HEIFERS

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Story in Brief

Beef heifers were backgrounded for 42 days on either dormant range and protein cubes (dry grass wintered) or limit fed a high concentrate ration in drylot to achieve daily gains of 1.0, 1.5, or 2.0 lb. After backgrounding, the heifers were allocated to either a 150-day season-long grazing or an 80-day intensive early stocking program. Following grazing, both groups were fed 145 days in the feedlot. Backgrounding treatments altered feedlot performance. Shrink during transit to the feedlot was less for the animals backgrounded at the two higher rates of gain (4.48 vs 5.20%). Final slaughter weight was increased by an increased rate of gain during backgrounding (by 44 lb at 1.0, 67 lb at 1.5, and 59 lb at 2.0 as compared to the cattle dry grass wintered). Feedlot feed efficiencies tended to be superior for cattle backgrounded at higher levels of gain (dry grass wintered, 6.56; 1.0 lb ADG, 6.47; 1.5 lb ADG, 6.34; and 2.0, lb ADG 6.29). Differences in feedlot performance between the intensive early stocking and the full season long grazing systems were large. Shrink during transit to the feedlot was 4.56 and 5.12% for the intensive early stocking and the full season long cattle, respectively. Daily gains were higher for the intensive early stocker cattle (3.80 vs 3.38). Feed intake tended to be higher for the full season long cattle (23.6 vs 22.2). As a result, feed required per pound of feedlot gain was 19.7% greater for the full season long cattle (6.99 vs 5.83). Even after adjusting for the greater initial weight of the full season long cattle (675 vs 586 lb), energetic efficiency was 10.9% poorer for cattle given extended grazing.

(Key Words: Grazing Systems, Limit Feeding, Feedlot Performance, Heifers, Energetic Efficiency.)

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Introduction

Cost per unit of gain of stocker cattle is lower if cattle gain is faster. Much of Oklahoma's grassland is at its peak for grazing in the months of May and June. Even with excellent forage, cattle need to gain more weight than can be expected from grass alone during these two months. Constrained by seasonal cattle price variations, cattlemen pick one of two options. The first is to graze the same animals through the summer until September even though rate of gain declines later in the season. The introduction of the "Oklahoma Gold" high protein cube has helped to increase gains in this program. The other option is to provide supplement to cattle either while they graze dormant range in the winter or are in drylot in the spring before the grass growing season. The latter option is of interest because often it is cheaper to add weight in the drylot than on pasture. While the rate and cost of gain of drylot feeding light weight cattle are attractive, much of this gain (McCollum et al., 1991) may be lost when cattle are returned to pasture. Previous studies (Gill et al., 1991) have indicated that cattle that had grazed the entire summer had very poor feedlot efficiencies compared to similar cattle placed on feed at an earlier age.

Materials and Methods

One hundred sixty head of Limousin crossbred heifer calves (initial weight=468 lb) were purchased in Georgia and shipped to the Pawhuska Research Station in February, 1990. The processing, backgrounding and grazing data have been reported (McCollum et al., 1991). The heifers were implanted with Synovex-H at the start of the winter period and were reimplanted at 84-day intervals throughout the grazing and feedlot phases. Each winter backgrounding period lasted 42 days. Forty head were allocated either to dormant range plus protein cubes (dry grass wintered) or were limit-fed a high concentrate ration in drylot to gain 1.0 (1.0), 1.5 (1.5), or 2.0 (2.0) lb/head/day. Twenty head from each group grazed either during a short intensive early stocking (IES) period from May 1, 1990 until July 20, 1990, or for the full season long (SLS) until September 28, 1990. At the end of the grazing period, the cattle were gathered, held overnight without feed or water and individually weighed the next morning. These weights were used as the starting weights for analyses of the feedlot data. Individual arrival weights at the feeding facility at Goodwell, Oklahoma (310 mile transit) were taken late in the afternoon as the cattle came off the truck; these were used to compute transit shrink. The heifers were given booster IBR-PI3 vaccinations on arrival at the feedlot, and each winter treatment group was assigned to two 10-head feeding pens. Cattle were penned based on their original pen assignments during the wintering phase. The cattle were given ad libitum access to feed with fresh feed added twice daily throughout the feedlot phase. They were adapted over 14 days through a series of four diets to a 91 percent concentrate diet (Table 1). In the workup diets; alfalfa hay and cottonseed hulls (2 to 1 ratio) replaced corn to achieve 50%, 60%, 70% and 80% concentrate rations. The cattle were fed to a feedlot endpoint at which experienced cattle buyers estimated that the cattle should grade choice and have a dressing percentage typical for this type of cattle. All cattle were fed for 145 days. The cattle were trucked to Dodge City, Kansas (120 miles) for slaughter and collection of carcass data. To calculate feedlot gains and feed efficiencies, final weights were calculated from hot carcass weight assuming that the dressing percentage was 64. All data were analyzed using the general linear model of SAS with the main effects being winter treatment and grazing treatment. With the exception of shrink in transit to the feedlot, no interaction between these main effects was significant.

Table 1. Feedlot diet composition (final diet).

Item	Diet % of DM
Corn, dry rolled	79.61
Alfalfa hay, ground	5.02
Cottonseed hulls	3.90
Molasses, cane	4.38
Cottonseed meal	3.55
Meat and bone meal	1.42
Distillers grains, corn	.87
Salt	.35
Calcium carbonate	.35
Urea, 46% N	.30
Ammonium sulfate	.21
Vitamin A & D_3[a]	.00375
Rumensin, 60 gram/lb	.018
Trace mineral premix	.014

[a] Contained 88,000 IU vitamin A and 88 IU vitamin D_3 per gram.

Results and Discussion

Heifers which had been intensively grazed early (IES) consumed slightly less feed in the feedlot (22.2 vs 23.6) than the SLS cattle (Table 2). Adjusted feedlot daily gain was greater for IES heifers ($P < .01$; 3.80 vs 3.38). These differences resulted in a much poorer ($P < .01$) feed efficiency for the SLS cattle (6.99 vs 5.83). This 19.7% higher feed requirement for the SLS cattle cannot be explained by increased mean feeding weight alone. Using the net energy equations to calculate feed energy values, which adjusts for differences in feeding weights and feed intake, the SLS cattle were 10.9 percent less efficient. The IES cattle were fed until December 12, 1990 whereas the SLS heifers were fed until February 20, 1991. Some slight difference in efficiency may be ascribed to the feeding season or environment. Yet, daily feed intakes and gains can be compared for periods when both groups were on feed. For example, daily feed intake during period 2 for the SLS cattle (late October early November) was 25.23 pounds of dry matter versus 21.24 pounds for IES cattle. During this period, liveweight gains for the IES cattle were higher even though these cattle had been fed more days. No difference was detected in the carcass traits (Table 5).

Weight entering the feedlot reflected the winter treatments with the cattle programmed for 2.0 pounds per day weighing 33 pounds more ($P < .05$) than the dry grass wintered cattle (Table 3). They were 59 pounds heavier

Table 2. Feedlot performance--summer treatments.

	IES	SLS
Off pasture wt, lb	586^c	675^d
Shrink, %	4.56	5.11
Total gain, lb^e	551	490
Slaughter weight, lb^e	1137	1165
ADG, lb^e	3.80^c	3.38^d
Feed intake, lb	22.2	23.6
Feed/gain	5.83^c	6.99^d
Calculated NEg, Mcal/cwt	59.47^a	53.61^b

^{a,b} Means with different superscripts differ ($P < .05$).
^{c,d} Means with different superscripts differ ($P < .01$).
^{e} Final wt was calculated as hot carcass wt/.64.

Table 3. Feedlot performance--winter treatments.

	Growing treatment				
		Programmed ADG, pounds			
	Dry grass wintered	1.0	1.5	2.0	Mean
Off pasture weight, lb	610[a]	632[ab]	637[bc]	643[bc]	630
Shrink, %	5.24	5.16	4.21	4.75	4.84
Total gain, lb	499	522	538	525	521
Slaughter weight, lb[d]	1109[b]	1153[ab]	1175[ab]	1168[a]	1151
ADG, lb[d]	3.44	3.60	3.71	3.62	3.59
Feed intake, lb	22.47	23.02	23.37	22.74	22.90
Feed/gain	6.56	6.47	6.34	6.29	6.41
Calculated NEg, Mcal/cwt	54.22	56.43	57.61	57.90	56.54

[a,b,c] Means with different superscripts differ ($P<.05$).
[d] Final weight was calculated as hot carcass weight/.64.

($P<.06$) at the end of the test. In transit shrink tended to be higher for groups of cattle backgrounded at the lower rates of gain. The SLS cattle tended to have higher ($P<.06$) shrink than the IES cattle. This was surprising because heat stress in transit was greater in July vs September. SLS cattle probably had greater fill.

The carcass traits (Table 4) indicated that the cattle which were backgrounded on dry forage were less fat at slaughter (lower yield grade; $P<.01$) than the cattle backgrounded at moderate levels of gain even though the backgrounding period was only 42 days in length and occurred 80 to 150 days prior to the feeding period.

Results of this and other studies suggest that prolonged grazing by cattle reduced feedlot efficiency drastically (19.7%). Season long grazed steers the previous year at Pawhuska (Gill et al., 1991) were 12.7% less efficient than the same steers grazed for the shorter IES period. Sindt et al. (1991) compared steers that grazed bromegrass during May and June to those given extended grazing on Sudan grass in July and August. The latter group consumed 14.9% more feed in the feedlot but gained at the same rate. As a result, these cattle were 14.9% less efficient. A third group of cattle was carried on Sudan grass and Brome regrowth until November 20th. In the feedlot these steers gained 19.6% slower than the previous group and

Table 4. Carcass characteristics.

	Growing treatment				
		Programmed ADG, lb			
	Dry grass wintered	1.0	1.5	2.0	Mean
Carcass weight, lb	709.6[a]	737.9[ab]	752.2[b]	747.6[ab]	736.8
Marbling score[c]	422	454	425	431	433
% Choice	55.83	67.50	62.50	61.67	61.88
Fat thickness, in	.42[a]	.49[ab]	.54[b]	.51[ab]	.49
REA, sq. in.	14.36[ab]	13.95[a]	14.31[ab]	15.08[b]	
KPH, %	2.10	2.05	2.01	1.94	
Yield grade[d]	2.08[a]	2.47[b]	2.54[b]	2.18[a]	

[a,b] Means with different superscripts differ ($P < .05$).
[c] 100-199 = Utility, 200-299 = Standard, 300-399 = Select, 400-499 = Choice, 500-599 = Average Choice, 600-699 = Choice +, 700+ = Prime.
[d] USDA 1-5.

Table 5. Carcass characteristics-- summer treatments.

	IES	SLS
Carcass weight, lb	728	746
Marbling score[a]	424	442
% Choice	58.75	65.00
Fat thickness, in	.49	.49
REA, sq. in.	14.42	14.44
KPH, %	1.96	2.08
Yield grade[b]	2.27	2.36

[a] 100-199 = Utility, 200-299 = Standard, 300-399 = Select, 400-499 = Choice, 500-599 = Average Choice, 600-699 = Choice +, 700+ = Prime.
[b] USDA grade.

consumed 9.6% more feed. Feed required per pound of gain in the feedlot was 36.4% greater than for cattle that only grazed Brome.

We do not know if the loss in efficiency observed with extended grazing periods merely reflects the fact that older cattle are less efficient. It also could be related to effects of high and prolonged intakes of lower quality forage on chewing extensiveness and digestibility or on maintenance requirements.

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