Feedlot Performance of Steers from Different Winter Grazing Programs

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Story in Brief

An experiment was conducted to determine the effect of liveweight gain during winter grazing on subsequent feedlot performance of beef steers. Forty-eight beef steers grazed either winter wheat to achieve maximal daily gain or approximately 1 lb/d of gain or dry winter native range before being placed into a feedlot for finishing. Our winter grazing treatments produced three populations of cattle with very different body conditions and degrees of fleshiness entering the feedlot. In the feedlot, all cattle were fed the same diet to the same backfat endpoint. During the first 50 d of the feedlot phase steers that gained slowly on wheat or grazed native range had improved average daily gains, gain efficiency, and consumed more feed than steers that had maximal gains grazing wheat. During the final feedlot phase and across the entire feedlot phase, average daily gain and gain efficiency were similar between treatments. Final carcass characteristics were similar between treatments. Steers that had slow winter liveweight gains on wheat or native range exhibited compensatory growth during the first 50 d in the feedlot. Additionally, steers that gained liveweight at a maximal rate on wheat pasture during the winter still performed well in the feedlot.

Key Words: Growing Cattle, Grazing, Compensatory Growth

Introduction

The increased use of coordinated beef production systems that incorporate different grazing systems can have profound effects on the body composition, physiological processes and subsequent feedlot performance. Fox et al. (1972) and Sainz et al. (1995) reported that alterations in body composition through previous nutrition could alter net energy maintenance requirements (NE_m) of growing cattle. Generally, as body condition score or fleshiness of cattle increases at a particular body weight, the amount of energy to support increased average daily gain decreases. Therefore, body condition score or fleshiness of cattle can have important effects on cattle feedlot performance. Previous nutrition that restricts cattle growth can positively affect cattle performance in the feedlot through compensatory growth. Compensatory growth is a period of faster or more efficient growth following a period of nutritional or environmental stress (NRC, 1996). Three characteristics of compensatory growth include; increased feed intake (Fox et al., 1972; Drouillard et al., 1991), increased efficiency of metabolizable energy used for gain (Fox et al., 1972, Carstens et al., 1991), and increased rate of liveweight gain (Carstens et al., 1991; Drouillard et al., 1991). Therefore, we hypothesized that steers with lower body weight gains and lower body condition resulting from the winter stocker grazing period will exhibit improved feedlot feed efficiency and daily body weight gain.

Materials and Methods

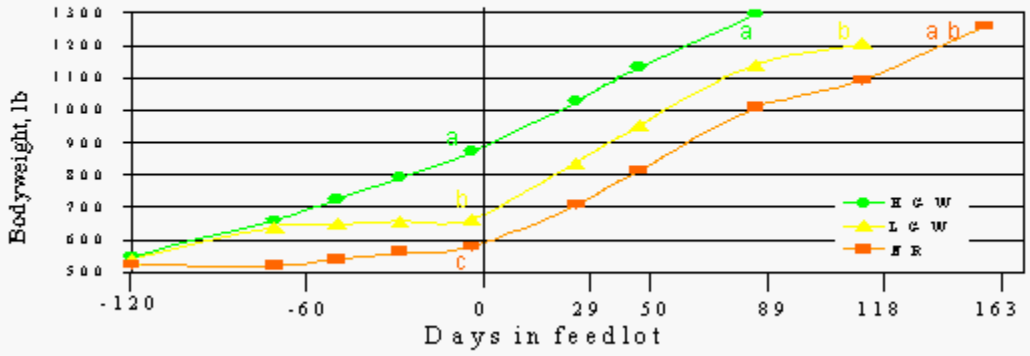
We utilized 48 fall-weaned Angus x Angus/Hereford steer calves from the same cowherd in a completely random design. On December 7, 1999, we assigned steers to one of three

treatments. The three treatments were high gain wheat (HGW) in which steers grazed winter wheat for maximal daily body weight gain (2.82 lb/d), low gain wheat (LGW) in which steers grazed winter wheat and stocking density was adjusted to control daily body weight gain (1.06 lb/d), and native range (NR) where steers grazed dormant native range and were offered 2 lb/d of a 41% crude protein supplement for minimal daily body weight gain (.46 lb/d). No implants were used during the winter grazing phase. After approximately 120 d grazing, steers were stratified by weight and randomly allotted to three feedlot pens per winter grazing treatment. We implanted all steers with Revelor-S at the initiation of the feedlot phase. All steers were fed ad libitum the same finishing diet that consisted of 79% whole shelled corn, 9% cottonseed hulls, 9% protein supplement, and 3% blended fat. Calculated analysis of the diet was 92.96% dry matter, 13.4% crude protein and a net energy for gain of 62.45 Mcal/100 lbs. Steers were fed to the same backfat endpoint of approximately 0.5 in at the 12th rib as determined by ultrasound. Monthly liveweights were obtained 3 to 4 h after steers received one-half of their daily feed allotment. Additionally we obtained carcass data prior to placement into the feedlot and as each treatment was harvested. Initial carcass data showed substanial differences in carcass back fat, marbling scores, and mesenteric fat (Hersom et al., 2001).

Data were analyzed using the GLM procedure of SAS (SAS Inst. Inc., Cary, NC) with least squares means calculated. Source of variation included in the model was previous winter grazing treatment. We considered feedlot pen the experimental unit for this analysis.

Results and Discussion

Figure 1. Bodyweight gain of steers during entire experiment



a,b,c Means without a common superscript differ (P < .05).

Bodyweight gain during the entire experiment is shown in Figure 1. All steers began grazing at the same BW, but after 60 d differences in BW are clearly evident. At the end of the winter grazing phase HGW steers BW (891 lb) was greater (P<.05) than LGW steers (686 lb) which was greater (P<.05) than NR steers (565 lb). Figure 1 also shows how the BW gain of HGW steers was not altered when animals were placed in the feedlot, whereas the BW gain of both LGW and NR steers showed dramatic increases when steers were placed into the feedlot. Final

BW were similar between HGW and NR (1296 and 1259 lb) however, LGW steers final BW (1204 lb) was lower (P<.05) than HGW steers.

Feedlot Performance. Performance data are presented in Table 1. During the first 50 d LGW steers had 12% greater (P<.05) and NR steers had 4% greater ADG than HGW steers. However, after the first 50 d, ADG was similar between treatments and averaged 3.66 lb/d. During the entire feeding period ADG was not different among the three treatments, averaging 4.38 lb/d. Dry matter intake expressed as a percentage of initial BW was greatest (P<.05) in NR steers, intermediate for LGW steers and lowest for HGW steers during the first 50 d. The same trend was evident during d 51 to harvest and across the entire feedlot phase, as the NR steers consumed the most, LGW steers intermediate and HGW steers the least feed per lb of initial BW. Mean feed intake from d 0 to harvest was not different (P>.05) among the three treatments. Our predicted feed intakes were lower than the actual mean feed intake for all treatments. When the intake differential between mean feed intake and predicted intake was calculated, LGW and NR steers had differentials 3.08 and 3.18 times larger than HGW steers. Gain efficiency was similar between LGW and NR steers and greater (P<.05) than HGW steers during the first 50 d of the feedlot phase. However, gain efficiency of all treatments was similar after 50 d, whereas when expressed across the entire feeding period, gain efficiency did not differ (P>.05) among treatment groups.

Table 1. Feedlot performance of steers from different winter grazing treatments

	HGW	LGW	NR	SEM
Initial BW, lb	891[a]	686[b]	565[c]	5.33
Final BW, lb	1294[a]	1203[b]	1257[ab]	17.59
Mean feeding weight, lb	1093[a]	945[b]	911[b]	10.19
ADG, lb/d				
0-50	4.77[a]	5.33[b]	4.94[c]	.13
51-harvest	3.36	3.69	3.94	.20
0-harvest	4.53	4.38	4.24	.14
DMI, % initial BW				
0-50	2.46[a]	3.08[b]	3.34[c]	.06
51-harvest	2.35[a]	3.62[b]	4.31[c]	.10
0-harvest	2.64[a]	3.41[b]	4.04[c]	.06
Mean feed intake, lb/hd/d	23.54	23.37	22.82	.38
Predicted feed intake, lb/d[d]	22.19	19.18	18.50	.21
Intake differential, lb/d[e]	1.36	4.19	4.32	.33
Gain:Feed				
0-50	.218[a]	.252[b]	.262[b]	.004
51-harvest	.160	.148	.162	.007
0-harvest	.193	.187	.190	.004

[a,b,c]Means within rows lacking a common superscript differ (P<.05).
[d]Mean feeding weight x 2.03%
[e]Mean feed intake lb/hd/d – predicted lb/hd/d

***Carcass Traits*.** Final carcass traits are presented in Table 2. Similar dressing percent (60.15%) was observed among treatments. While these dressing percents appear low, they are similar to those reported by Parsons and Stanton (2000) for cattle fed whole corn diets. Hot carcass weights were greater (P<.05) in HGW steers than LGW steers due to the difference in final BW. Both HGW and NR steers had a numerically greater amount of marbling than did LGW steers. Back fat at the 12th rib was similar among all treatments by design of the experiment. Ribeye area and yield grade were similar among treatments. Because HGW steers entered the feedlot with a greater amount of finish, KPH% was greater in these steers than LGW or NR steers. Because of the lower marbling scores, fewer (P<.05) LGW steers graded low choice or greater than either HGW or NR steers.

Table 2. Final carcass characteristics of steers from different winter grazing treatments

	HGW	LGW	NR	SEM
Dressing %[a]	60.77	59.11	60.56	.61
Hot carcass wt, lb	753.5[c]	701.7[d]	731.5[cd]	13.87
Marbling score[b]	1048	991	1007	22.9
12th Rib fat, in	.64	.63	.61	.05
Ribeye area, in^2	11.96	11.83	12.47	.35
Yield grade	3.49	3.25	3.16	.16
KPH, %	2.19[c]	1.72[d]	1.69[d]	.14
% Choice	66.0	15.0	45.0	

[a]Dressing % = HCW/Final BW x 4%.
[b]Marbling score 1000 = low choice
[c,d]Means within rows lacking a common superscript differ (P<.05).

While the HGW steers entered the feedlot in a very fleshy condition, those steers were still able to perform well. Additionally, both LGW and NR had increased feed intake, increased efficiency of feed use, and increased rate of liveweight gain steers during the first 50 d of the feedlot phase, indicating that LGW and NR steers did undergo compensatory growth. However, this early performance advantage, when looking at the entire feedlot phase, may have been overshadowed by feeding those steers to the same carcass endpoint as HGW steers.

Implications

Steers with a reduced amount of body condition or fat at the initiation of the feedlot phase are more efficient at converting feed into BW during the early part of the finishing phase. However, longer feeding periods may counteract the observed improvement. The acceptable performance

of fleshy cattle from wheat pasture may be an exception to the generalization that feedlot performance is negatively related to body condition entering the feedlot.

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