Effects of Different Winter Growing Programs on Subsequent Feedlot Performance and Carcass Characteristics of Beef Steers

M.P. McCurdy, G.W. Horn, C.R. Krehbiel, and J.J. Wagner

Story in Brief

The purpose of this study was to investigate the effects of winter growing program on subsequent feedlot performance of beef steers. A total of 260 steers were utilized for the experiment and were allotted to one of four treatment groups. One group was ad libitum fed a high-concentrate diet (CF), another grazed on wheat pasture (WP), the third was fed a sorghum silage-based growing diet (SF), and the fourth group was program fed a high-concentrate diet (PF). Steers in the WP, SF, and PF groups were managed to achieve approximately equal rates of body weight gain. After the growing phase steers in the WP, SF, and PF treatments were adapted to a high-concentrate diet for finishing and then all steers were harvested at a common backfat. During the finishing phase DMI was greater for SF steers than PF steers, with WP steers being intermediate. Steers in the SF group had the highest ADG, PF steers were intermediate and WP steers were lowest. This resulted in WP steers exhibiting the least desirable feed efficiency during finishing. At harvest, WP steers had lower yielding carcasses as compared to SF and PF steers. In conclusion, both SF and PF steers had higher gains and converted feed to gain more efficiently during the finishing phase as compared to WP steers. Additionally, carcasses from SF and PF steers had more desirable yield grades. Thus, dry-lot growing programs may result in greater, more efficient gains in the finishing phase as compared to grazing and have a positive impact on carcass merit.

Key Words: Wheat Pasture, Silage, Program Feeding, Finishing

Introduction

As an increasingly larger percentage of cattle on feed move through production alliances, and vertically coordinated supply chains, it is more important than ever to understand the effects that management and nutrition in each segment has on subsequent phases of production and final carcass value. It is also important to determine the effects of nutrition and management throughout the production chain on marbling and subsequent carcass quality (Berger and Faulkner, 2003).

After weaning, calves are generally placed on a growing diet to achieve adequate frame size and carcass weight before entering into a finishing program. Across the southern plains and the southeastern U.S, grazing of cool season forages, including wheat pasture, is utilized to grow cattle to desirable weights for feedlot entry (Byers, 1982). On the northern plains and across the Midwest harvested and ensiled crops, may be fed to growing cattle. Additionally, high-concentrate diets may be fed at restricted levels in the growing phase to provide a desired rate of gain while allowing for lean growth (Sip and Pritchard, 1991). Because of the variability in growing programs, performance and weight gain of cattle before feedlot entry may be vastly different. Although it is well established that management and nutrition during the growing phase affects the performance of cattle during finishing, the nature and the extent of the effect have been questioned. Therefore the objective of this experiment was to determine the effects of

growing regime on subsequent feedlot performance and carcass merit in beef steers that were grown in one of four different winter growing systems that are commonly used for backgrounding feeder calves in the United States.

Materials and Methods

A total of 260 steers were utilized for the experiment. Fifty steers from the Oklahoma State University cow herd were weaned in the fall of 2003. The remaining 210 steers were purchased by Continental Beef Research to be of similar breed, type, and age. The steers were blocked by weight and randomly allotted to one of four treatment groups for winter feeding. The composition of each diet is shown in Table 1. One group of steers were placed in the feedlot (n=8 pens; 8 steers/pen) immediately after weaning and fed a high-concentrate finishing diet ad libitum (CF). The three remaining treatment groups were managed on three different growing systems to achieve approximately equal rates of BW gain. One group was grazed on wheat pasture with unrestricted forage availability (WP; n=64), a second group was fed a sorghum silage-based growing diet (SF; n=8 pens; 8 steers/pen), and the third group was program fed a high-concentrate diet (PF; n=8 pens; 8 steers/pen).

Table 1. Dry matter composition of diets

	Diet		
Ingredient	Sorghum silage-based diet	Program-fed growing diet	Finishing diet
Dry matter of diet, %	35.70	54.22	63.87
Steam-flaked corn	25.94	60.88	76.14
Sorghum silage	62.56	23.52	11.76
Condensed corn distillers solubles	3.00	3.00	3.00
Yellow grease	--	3.50	3.50
Soybean meal	7.08	5.80	2.26
Supplement	1.42	3.30	3.35

All feedlot feeding took place at Continental Beef Research, Lamar, CO while wheat pasture grazing took place at the Oklahoma State University Wheat Pasture Research Unit. Processing procedures for steers at both locations were as follows. Steers were treated for parasites with IVOMEC Plus, vaccinated with Titanium 5 and Vision 7, and implanted with Component ES. All steers were re-vaccinated with Titanium 5 L5 approximately 14 days after the start of the trial.

Weighing conditions were as follows. Steers from all groups were weighed at 28-d intervals. During the growing phase steers in the SF, PF and CF groups were weighed immediately after removal from their feedlot pens. A 4% pencil shrink was applied to weights from SF and CF steers. Due to the restricted amount of feed received by PF steers, weights from that treatment group were shrunk 3% to account for differences in fill. Steers in the WP group were gathered off pasture at approximately 0700 h on weigh days, and held in pens for two to three hours prior to weighing. Due to the increased holding time prior to weighing, only a 2% pencil shrink was applied to weights of WP steers. During the finishing phase steers in all treatment groups were weighed immediately after removal from their feedlot pens and a 4% pencil shrink was applied to weights.

At the end of the growing phase (112 d), steers from all treatment groups were adapted to the high-concentrate finishing diet and placed in the feedlot (n=8 pens; 8 steers/pen). Steers on treatments 1-3 were re-implanted with Revalor-S at the start of the finishing program. Treatment-4 steers were re-implanted with Revalor-S at d 84 of the trial. After the finishing phase, steers from all treatment groups were harvested at a common backfat of 0.5 in as determined by ultrasound and complete carcass data was collected.

All data for feedlot performance and carcass characteristics were analyzed as a randomized complete block design using generalized least squares (PROC MIXED, SAS Institute, Cary, NC). Pen was considered as the experimental unit for all data and the model for all measurements included treatment as a fixed effect and block (initial weight) as a random effect. Mean separation was accomplished using Least Significant Difference and means were considered to be significantly different at the $P<0.05$ level.

Results and Discussion

During the growing phase WP, SF, and PF treatments gained 2.53, 2.42, and 2.61 lb/d, respectively (Table 2), with SF steers differing from the WP and PF groups ($P<0.01$). Performance during the finishing phase is shown in Table 3. During finishing DMI was greater for SF steers (24.0 lb/d) than for PF steers (22.2 lb/d) ($P<0.01$), with WP steers being intermediate (23.0 lb/d). Steers in the CF group had a lower DMI (19.0 lb/d) as compared to all treatment groups ($P<0.01$) but length of finishing was 70-84 d longer than the three groups that were placed on growing diets. Steers in the SF group had greater ADG (4.51 lb/d) than PF steers (4.23 lb/d) ($P<0.05$), and PF steers had greater ADG than both WP and CF steers (both 3.54 lb/d) ($P<0.01$). This resulted in WP steers exhibiting the lowest ($P<0.01$) efficiency in feed to gain conversion (6.52) as compared to SF, PF and CF groups (5.34, 5.25, and 5.37 respectively).

Table 2. Effect of treatment on performance during the growing phase

	Treatment				
	WP	SF	PF	SEM	P-Value
Initial Wt	557[a]	522[b]	517[b]	6.39	<.0001
Final Wt	829[a]	813[a]	831[a]	11.95	<.5060

DMI	--	17.0[a]	13.4[b]	.43	<.0005
ADG	2.53[a]	2.42[b]	2.61[a]	.05	<.0088
F:G	--	7.04[a]	5.16[b]	.25	<.0008
[abc]Means without a common superscript differ significantly (P<.05)					

Table 3. Effect of treatment on performance during the finishing phase

	Treatment					
	WP	SF	PF	CF	SEM	P-Value
Initial Wt	829[a]	813[a]	831[a]	527[b]	10.79	<.0001
Final Wt	1287[a]	1282[c]	1258[ab]	1233[b]	13.71	<.0001
Days on Feed	121	107	107	191	--	--
DMI	23.0[ab]	24.0[a]	22.2[b]	19.0[c]	.52	<.0001
ADG	3.54[a]	4.51[b]	4.23[c]	3.54[a]	.10	<.0001
F:G	6.52[a]	5.34[b]	5.25[b]	5.37[b]	.15	<.0001
[abc]Means without a common superscript differ significantly (P<.05)						

Carcass data is presented in Table 4. At harvest, steers in the CF treatment had smaller ribeyes as compared to SF and PF steers (P<0.05), with WP steers being intermediate. This resulted in less desirable yield grades for CF and WP steers as compared to SF and PF steers (P<0.01). However, steers in the SF treatment had higher marbling scores and greater incidence of choice carcasses as compared to CF and WP steers (P<0.01) with PF steers being intermediate.

Table 4. Effect of treatment on carcass characteristics

	Treatment					
	WP	SF	PF	CF	SEM	P-Value
Live Wt	1345[a]	1336[a]	1312[ab]	1286[b]	14.6	<.018
Dressing %	63.3[a]	62.5[b]	63.3[a]	63.8[a]	0.26	<.006
HCW	851[a]	836[ab]	829[ab]	818[b]	9.7	<.118

12th rib backfat	.53[a]	.50[a]	.49[a]	.64[b]	.019	<.001
REA	13.4[ab]	13.9[a]	13.8[a]	13.1[b]	.20	<.023
KPH%	3.0[a]	3.0[a]	3.0[a]	3.1[a]	.05	<.412
USDA Yield Grade	3.19[a]	2.76[b]	2.94[b]	3.39[a]	.076	<.001
Marbling Score[1]	409[a]	449[b]	423[ab]	401[a]	9.8	<.012

[abc]Means without a common superscript differ significantly (P<.05)

[1]300=USDA Slight[00], 400=USDA Small[00], 500=USDA Modest[00]

Of the three groups that were placed on growing diets, the greatest gains during finishing were achieved by steers in the SF treatment group. However steers in the SF and PF treatment groups had greater feed efficiency as compared to WP steers. Steers in the WP group were lowest in both ADG and feed efficiency. Additionally SF and PF steers had more desirable yield grades as compared with WP and CF steers. The SF treatment resulted in greater marbling scores as compared to the WP and CF treatments. It is thus concluded that dry-lot feeding programs that are targeted for growing cattle can provide a viable alternative to winter wheat pasture grazing. Winter growing diets consisting of silage and/or high-concentrates, fed in a restricted amount, and may result in greater, more efficient gains during finishing as compared to grazing. Additionally, these types of backgrounding diets may enhance carcass yield grades. It is further concluded that ad libitum feeding of a high concentrate diet with the absence of a growing phase may negatively impact carcass characteristics.

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Authors List

McCurdy, Matthew P. - Graduate Assistant

Krehbiel, Clint R. - Associate Professor

Horn, Gerald W. - Professor

Wagner, John J. - Manager, Continental Beef Research