The Effect of an Extended Grazing Season and Annual Forages on Yearling Steer Performance and Economics

Progress Report

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Introduction

Beef production is always in a state of continuous change. High grain prices supported by corn ethanol production and greater profitability in the stocker cattle business will lead to fewer calves and a greater number of yearlings being placed on feed in the future. Yearling and long-yearling cattle make up 45-55% of total feedlot placements (Brink, 2011).

At a time period in the beef business when calves are in short supply, there is no suggestion that producers shift totally from cow-calf production to yearling production, but there may be opportunities to shift some allocation of cropland to forage production for yearling grazing. Typically, adding a yearling enterprise to a cow-calf business requires adjusting forage acreage allocation, because retaining yearlings competes for cow-calf acres unless additional acreage is either purchased or rented. However, utilizing some cropland for yearling production will reduce pasture competition leaving more pasture available for cow-calf production.

Compared to placing yearling steers directly into the feedlot, the purpose of this study is to evaluate two grazing beef production systems, i.e. a full-season pasture grazing system versus an integrated system in which some pasture and annual forages (field pea-barley and unharvested standing corn) are utilized to support the yearling enterprise.

Results from the first year of a two-year study are summarized briefly in this report.

Materials and Methods

After weaning in November 2011, seventy-two medium to large frame steers (5-7 frame score) were wintered for modest gain of 0.96 lb/day grazing corn aftermath and medium quality hay. On May 2, the steers were randomly divided into three groups of 24 steers each based on body weight. The treatment groups were as follows: 1) Feedlot Direct (**FLT**), 2) Full-Season Perennial Pasture (Crested Wheatgrass and native range) (**PST**), 3) Partial-Season Perennial Pasture and Annual Forage (**ANN**). The FLT steers were shipped directly to the University of Wyoming, Sustainable Agriculture Research Extension Center, Lingle, WY, where they were fed to harvest weight and slaughtered on September 20. Steers assigned to the two grazing treatments were shipped to the same feedlot on October 26 and fed to final harvest.

During the grazing season, PST steers were rotated from spring Crested Wheatgrass to native range pastures in early June and in the ANN treatment the steers were rotated from Crested Wheatgrass to native range mid-June, and from native range to field pea-barley mid-August for 21 days, and then moved to standing unharvested corn for 49 days. Forage crude protein change that occurred during the timeframe, when each forage type was grazed, is shown in Figures 1-4. The project goal in the ANN treatment was to graze the pastures and annual forage fields until forage crude protein content dropped below 10.0% CP or the pasture or field was sufficiently grazed. Grazing season cost/steer was calculated on a per head per day basis using the method shown in Table 1.

The length of time on feed was determined using ultrasound measurements for ribeye muscle area (longissimus dorsi), external fat depth and percent intramuscular fat. Once the harvest end point was determined, the steers from each group were slaughtered at Cargill Meat Solutions, Ft. Morgan, Colorado. After the 177 day extended grazing period, the number of feedlot days on feed were 69 and 90 days for the ANN and PST steers, respectively.

In the packing plant and after a 48 hour chill, strip loin steaks were collected from each carcass half between the 12^{th} and 13^{th} ribs and frozen for shear force and sensory panel evaluation at the NDSU Meats Lab.

The data was analyzed using MIXED procedures of SAS. In the analysis, hot carcass weight was determined to differ significantly between the grazing and the feedlot direct steers; therefore, hot carcass weight was used as a covariate when the carcass data was analyzed.

Results and Discussion

The steer pasture and feedlot performance is summarized in Tables 2 and 3. Steer growth rate was very different between the three treatment groups, especially between the grazing steers and feedlot steers. Average daily gain for the grazing steers was 2.23 and 2.47 lb/steer/day for the PST and ANN steers, and 4.21 lb/steer/day for the FLT steers. Compared to the grazing steer ADGs, the FLT steer ADGs were 1.79 times greater, which reduced the FLT steer time from birth to slaughter by an average 3.9 months (FLT - 17.6 months; PST & ANN - 21.5 months). The grazing steers grazed a total of 177 days (May 2-Oct 26) compared to the FLT steers that were confined in the feedlot for 133 days (May 2-Sep 20). The cost/head/day for the PST steers was $0.8820/day and $0.8456/day for the ANN steers up to being transferred to the annual forage fields. The total grazing cost/head was $156.12 for the PST steers and $234.70 for the ANN steers (Pasture cost $90.48 + annual forage cost $144.23). Grazing gain for the PST steers was 394.8 lb and 437.0 lb for the ANN steers, resulting in a pasture cost/lb of gain of $0.3956 for the PST steers and $0.5370 for the ANN steers.

Compared to the FLT steers, ADGs and feed costs/lb of gain for the grazing steers in the feedlot were similar, but total feeding costs were significantly lower due to extended grazing. Including annual forage grazing elevated grazing gain and carcass quality prior to feedlot entry, which resulting in the shortest feedlot finishing period of 69 days, compared to 90 days on feed for the full-season pasture treatment (Table 3). Correspondingly, and compared to the FLT group, both grazing methods, PST and ANN, reduced feedlot residency and feedlot feeding cost. Feedlot feeding cost/steer in the ANN group was reduced by 90.8% and feeding cost for the PST steers was reduced by 41.7%.

Carcass closeout measurements are summarized in Table 4. Steers in the FLT group had lighter hot carcass weight than either of the extended grazing treatments, suggesting that the FLT group could have been on feed for an additional 40 days or more. However, the important observation is that the extended grazing treatments produced carcasses of very high quality grade at a much lower cost. Carcasses from the PST system graded 75.0% Choice or higher and those from the ANN graded 91.7% Choice or higher; the FLT carcasses graded 43.5% Choice or better. Higher carcass quality resulted in higher carcass value for the two extended forage grazing systems compared to the FLT direct system.

At the time this report was prepared, the strip loin shear test and sensory panel evaluations had not been completed.

The net return for each of the three systems evaluated is shown in Table 5. Net return/steer was $105.04, $123.08, and -$267.55 for the PST, ANN, and FLT, respectively.

As noted, this report is a progress report to identify trends that are developing in the research, but final conclusions can only be made after all of the data from the two-year investigation has been compiled and analyzed. Although the preliminary results reported here are promising, there is no assurance that they will be repeatable.

A second group of March-April steer calves are being wintered for the 2012 summer and fall grazing season. In the next annual report published in the spring of 2013, all of the combined growth, carcass, shear force, sensory panel, and economic information will be reported.

Fig. 1 Crested Wheatgrass crude protein change (May-July)

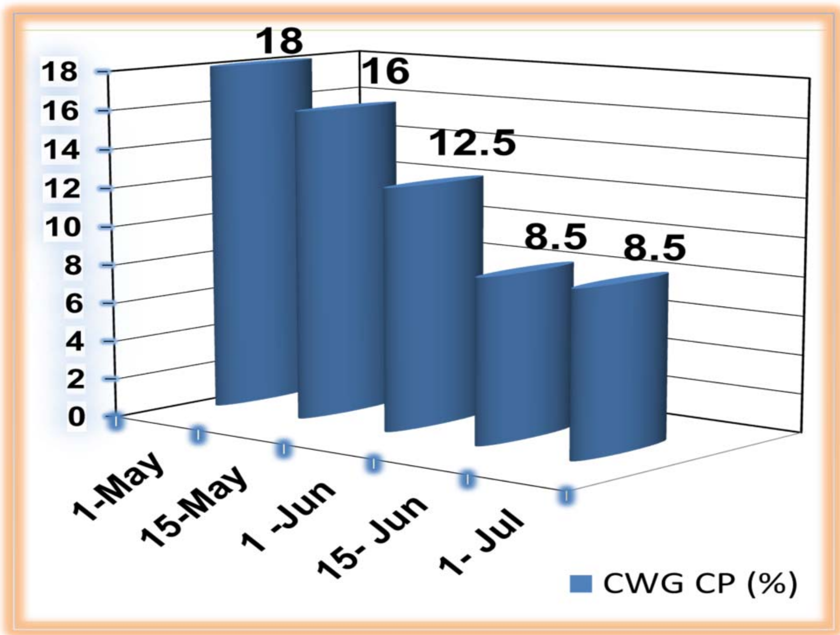

Fig. 2. Native range crude protein change (June-Aug)

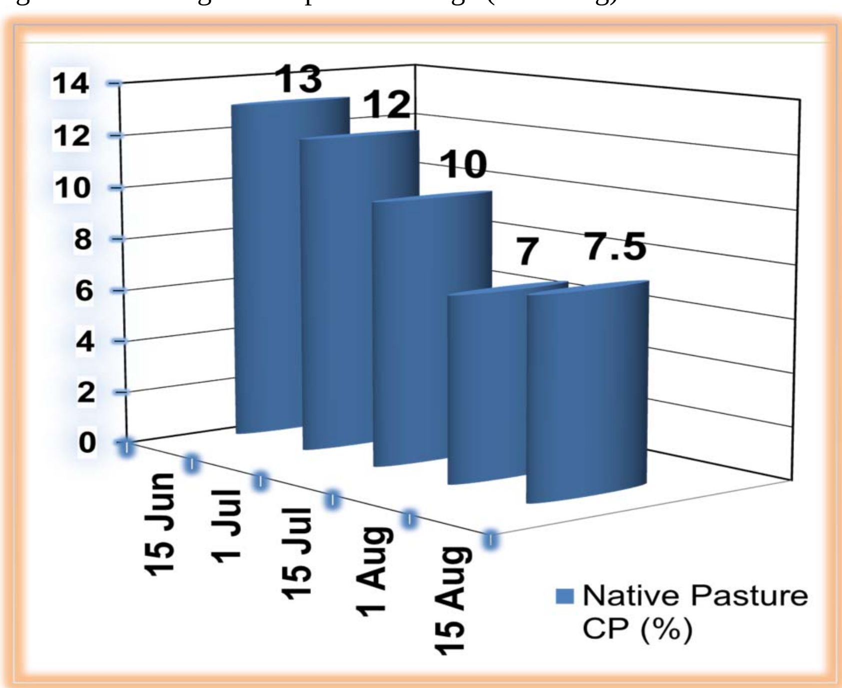

Fig. 3. Field Pea-Barley crude protein change (July-Sept)

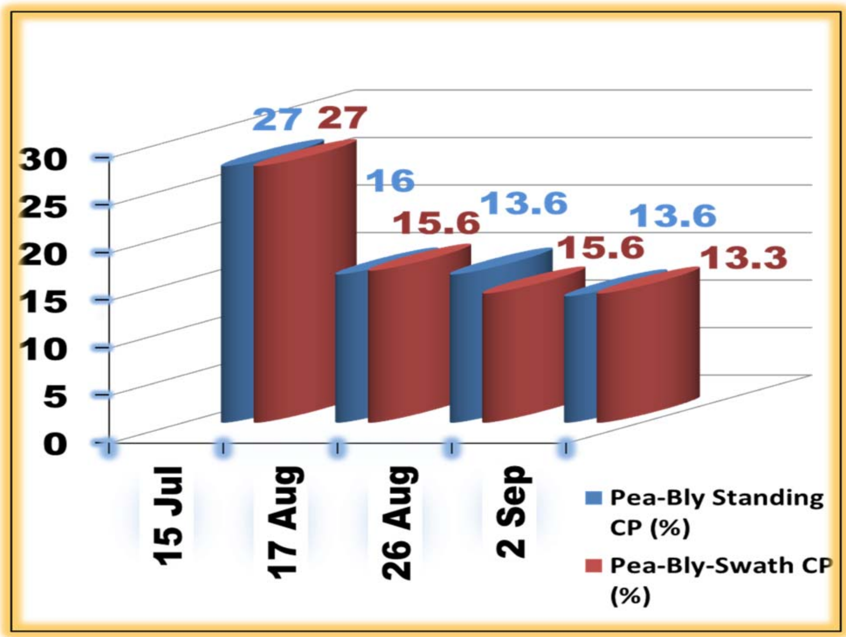

Fig. 4 Unharvested corn crude protein change (Aug-Oct)

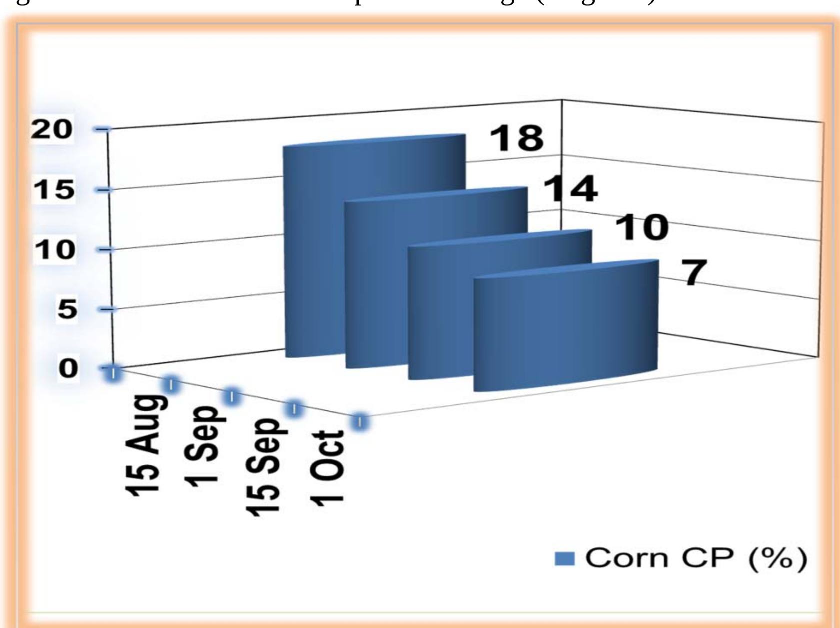

Table 1. Grazing rate calculation (**Per Head/Day Basis**)

Full-Season Pasture (PST)	**Constant**	**Weight**	**Cost/day**	**Days - (Total/2)**	**Period Total**	**Cost/ Steer/Day**
Date In		**In Wt**				
May 2	0.0009	780	$0.702	88	$61.78	
Date Out		**Out Wt**				
Oct 26	0.0009	1174	$1.06	89	$94.34	
Pasture Cost/Str				177 Days	$156.12	$0.882
Pasture & Annual Forage (ANN)						
Date In		**In Wt**				
May 2	0.0009	791	$0.7119	54	$38.44	
Date Out		**Out Wt**				
Oct 26	0.0009	1091	$0.9819	53	$52.04	
				107 Days	$90.48	$0.8456
Field Pea-Barley						
Input Cost/Str[a]				21 Days	$49.87	
Unharvested Corn						
Input Cost/Str[b]				49 Days	$94.36	
Total Cost/Str				177 Days	$234.71	

[a] Field Pea-Barley Crop Input Cost – Seed $25.40/ac, Seeding $15/ac, Innoculant $5.08/ac, Pre-Plant Chemical $3.18/ac, Windrowing $10/ac, Land Rent $30/ac = ($88.66/ac x 13.5 ac)/24 Steers = $49.87/Steer

[b] Unharvested Corn – Seed $47.82/ac, Planting $15/ac, Fertilizer (Urea $37.85/ac, MESZ $28.69/ac, Potash $4.96/ac), Chemical $3.43/ac, Land Rent $30/ac = (167.75/ac x 13.5 ac)/24 Steers = $94.36/Steer

Table 2. Yearling steer extended grazing system analysis (**Grazing Performance**)

	Perennial Grass	**Perennial Grass & Ann. Forage**	**SE**	**P-Value**
No. Steers	24	24		
Pasture Days Grazed	177	177		
Pasture Start Wt., lb	779.0	789.6	3.33	0.149
Pasture End Wt., lb	1173.8[a]	1226.6[b]	6.39	0.025
Pasture Gain, lb	394.8[a]	437.0[b]	3.41	0.0097
Pasture ADG, lb	2.23[a]	2.47[b]	0.0193	0.0098
Pasture Cost/Head, $	156.12	234.70		
Pasture Cost/Lb Gain, $	0.3956	0.5370	0.0036	0.0009

[a-b] Means within a row with different superscripts differ ($P < 0.05$).

Table 3. Yearling steer extended grazing system analysis (**Feedlot Performance**)

	Perennial Grass	**Perennial Grass & Ann. Forage**	**Feedlot**	**SE**	**P-Value**
No. Steers	24	24	23		
Feedlot Days on Feed	90	69	133		
Kill age, Months	21.7^{b}	21.2^{a}	17.6^{c}	0.0839	0.0001
Feedlot Start Wt., lb	1124.7^{a}	1195.2^{b}	761.4^{c}	27.60	0.0002
Feedlot End Wt., lb	1496.3^{a}	1489.5^{a}	1320.7^{b}	29.13	0.0034
Feedlot Gain, lb	371.6^{a}	294.3^{b}	559.3^{c}	13.56	0.0001
Feedlot ADG, lb	4.12	4.27	4.21	0.167	0.828
Feed/Head, lb	2632^{b}	1905^{a}	3353^{c}	5.20	0.0001
Feed Efficiency, lb	7.08^{a}	6.47^{b}	5.99^{b}	0.267	0.076
Feed Cost/Lb Gain, $	0.9643	0.9045	0.9148	0.0365	0.504

[a-c]Means within a row with different superscripts differ ($P < 0.10$).

Table 4. Yearling steer extended grazing system analysis (**Carcass Closeout Measurements**)

	Perennial Grass	**Perennial Grass & Ann. Forage**	**Feedlot**	**SE**	**P-Value**
No. Steers	24	24	23		
Hot Carcass Weight	860.5^{a}	850.6^{a}	745.5^{b}	15.33	0.0017
REA (Ribeye Area) SE[d]	13.99^{a} (0.380)	13.11^{ab} (0.259)	12.93^{b} (0.227)		0.041
Fat Depth SE[d]	0.58^{a} (0.0354)	0.537^{a} (0.0310)	0.258^{b} (0.0520)		0.027
Marbling Score SE[d]	458.3 (26.39)	471.2 (23.14)	388.0 (38.80)		0.372
Yield Grade SE[d]	3.39^{a} (0.074)	3.34^{a} (0.0652)	2.08^{b} (0.109)		0.0013
Percent Choice or Better, %	75.0^{b}	91.7^{a}	43.5^{c}	5.25	0.0036

[a-c]Means within a row with different superscripts differ ($P < 0.10$).
[d]Standard Error; hot carcass weight used in covariate analysis

Table 5. Yearling steer extended grazing system analysis (**Systems Budget**)

	Perennial Grass	**Perennial Grass & Ann. Forage**	**Feedlot**
No. Steers	24	24	23
Income:			
Carcass Value/Head, $	**1747.48**	**1760.94**	**1376.87**
Expenses:			
Steer Cost/Head, $	998.78	1012.80	991.38
Pre-Grazing Cost/Head, $	60.00	60.00	60.00
Grazing Cost/Head			
Perennial Grass	156.12	90.48	
Field Pea/Barley		49.87	
Standing Unharvested Corn		94.36	
Feedlot Feeding Cost/Head, $	356.79	265.03	505.60
Transportation, Health & Brand	70.75	65.32	87.44
Total System Expense/Head, $	**1642.44**	**1637.86**	**1644.42**
System Net Return/Head, $	**105.04**	**123.08**	**-267.55**

Literature Cited

Brink, T., 2011. The changing structure of beef production: stockers, calf-feds and yearlings. In the Range Beef Cow Symposium XXII, Mitchell, NE. Contact: kjenkins2@unl.edu