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January 2003

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Anderson, Rosemary; Rasby, Richard J.; Klopfenstein, Terry J.; and Macken, Casey, "Evaluation of Cow and Calf Performance and Profit Potential in Beef Systems" (2003). *Nebraska Beef Cattle Reports*. 218.
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Evaluation of Cow and Calf Performance and Profit Potential in Beef Systems

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Extending grazing for cows and for calves post-weaning using corn stalks and pasture before finishing increases production and profit potential of beef systems.

Summary

A three-year experiment was conducted to determine the production efficiencies of two beef systems. Spring-calving, crossbred cows were either wintered on pasture (Control System) or on corn stalks (Treatment System). Control System steers were transported to a feedlot, fed a finishing diet and harvested. Treatment System steers were wintered on corn stalks, grazed pasture, fed a finishing diet, and harvested. Cow weights and condition differed but pregnancy rates were similar. Control System steers spent more days in the feedlot, had lower feed conversions and higher marbling scores. Treatment System steers had higher average daily gains and produced heavier carcasses.

Introduction

The costs associated with feeding harvested forages contribute to a large proportion of the total feed costs in maintaining a cowherd in Nebraska. Additionally, most traditional beef finishing systems in the United States use large amounts of grain fed to calves after weaning for extended periods of time. Crop-residue grazing is one management strategy to minimize feed costs for both spring-calving cows and calves post-weaning. Yearling systems that employ extensive grazing of pasture and/or crop residues before a short finishing period before slaughter suggest carcass quality is similar to calf-feeding systems (*2002 Nebraska Beef Cattle Report* pp. 42-45).

There are data in the literature that evaluate various beef production systems from weaning to harvest, but the literature is almost void of data that includes the cow/calf enterprise as part of a total system. Therefore, the objectives of this study were to compare cow and calf performance and carcass characteristics of a traditional beef production system with a system that matches cattle to the forage resource in a diversified crops operation that includes a cow/calf enterprise.

Procedure

In year one of this three-year experiment, 170 MARC II (1/4 Angus, 1/4 Hereford, 1/4 Simmental, 1/4 Gelbvieh) spring calving cows were blocked by age, weight, body condition score, and expected calving date, and assigned randomly to two treatment groups. Cows remained in their treatment groups throughout the experiment unless culled for reproductive failure. The control (CON; n=85) treatment consisted of cows grazing dormant cool-season pasture through the fall and winter and fed hay. The treatment (TRT; n=85) group consisted of cows grazing corn stalks through the fall and winter and fed hay for a short period. Grazing quality of the corn stalks was evaluated each year by estimating the amount of grain remaining in the field after harvest. The amount of hay and supplement fed to both groups were monitored and recorded annually. Both groups were managed to achieve a mean body condition score (BCS) of 5 (1=emaciated; 9=obese) by calving. Each year, cows were managed as a single group from calving until corn stalks were available for TRT cows. Weights and body condition scores of all cows were determined at weaning, immediately before corn stalk grazing and immediately after corn stalk grazing.

Each year at weaning, steer (n = 42 per year) calves from CON cows were transported to the feedlot, were implanted with Synovex-S© blocked by weight and assigned randomly to one of two pens. After a 28-day receiving period, steers were fed a series of five step-up rations beginning with a 50% concentrate diet and progressing to a 90% concentrate finishing diet (TDN 84%, CP 12%) that was fed until slaughter. Steers were reimplanted with Revalor-S© after 90 days on feed. Steers were harvested when visually appraised to be 0.5 inch 12th-rib fat thickness. CON steers were weighed at weaning, at the beginning of the 28-day receiving period, and at reimplantation. Days on feed (DOF), pen dry matter intake (DMI), average daily gain (ADG) and feed conversion (F/G)

(Continued on next page)

were measured. Carcass traits were recorded and included hot carcass weight (HCW), twelfth-rib fat thickness (FAT), marbling score (MARB; 500 = small[00]), Yield Grade (YG) and ribeye area (REA). Final weight was estimated by dividing HCW by 63% dress.

Steers (n = 44 per yr) from TRT cows were transported to the ARDC each year at weaning and were drylotted until corn stalks became available for grazing. While in drylot, steers were fed ammoniated wheat straw ad libitum and supplemented with 5 lb/steer/day (DM basis) of wet corn gluten feed and mineral. Corn stalk grazing was also supplemented with mineral and corn gluten feed. Hay was fed during heavy snowcover. After grazing corn stalks, TRT steers again were drylotted for the remainder of the wintering period until pasture was available for spring and summer grazing. Steers were implanted with Revalor-G© in the spring before grazing cool- and warm-season grass pastures. Following the summer grazing period, TRT steers entered the feedlot, were reimplanted with Revalor-S©, blocked by weight and assigned randomly to one of two pens. Steers then were fed similarly to CON steers for the step-up and finishing periods. Twelfth-rib fat thickness was estimated in years 1 and 2 every two weeks near the end of the finishing period using ultrasound technology. TRT steers subsequently were sorted and serially slaughtered according to weight and fat thickness of 0.5 inch. In year 3, TRT steers were not ultrasounded; instead, steers were slaughtered after a predetermined number of days on finishing diets based on the previous two years of data. TRT steers were weighed at weaning and at the beginning of the wintering period, summering period and finishing period. Weights were also taken simultaneously with ultrasound readings every two weeks near the end of the finishing period during years 1 and 2. Days per period were recorded each year and ADG was calculated for each period. DMI and F/G also were calculated for the finishing period. Upon slaughter, carcass data were collected similar to CON steers.

Data were analyzed using the MIXED procedures of SAS and year was included in the model as a random variable. Pregnancy data were analyzed as a binomial distribution using the logit transformation statement. Because 12th rib fat thickness at slaughter was different between CON and TRT steers, carcass data, DOF, and final weights were adjusted to 28% empty body fat (Guiroy et al., 2001; J. Anim. Sci. 79: 1983-1995). The 1996 NRC for beef cattle assumes that steers at 28% empty body fat would have marbling scores of Small[oo] and grade USDA Quality Grade of Low Choice.

Table 1. Performance of treatment steers during the winter and summer across years.

Item	Year 1	Year 2	Year 3	SEM
Number of Steers	43	47	42	
Winter				
Days	200[a]	188[b]	203[c]	
Initial Weight	509[d]	486[e]	516[d]	9
ADG, lb	1.17[d]	1.08[e]	1.23[d]	0.03
Summer				
Days	112[a]	145[b]	96[c]	
Initial Weight	746[d]	688[e]	765[d]	12
ADG, lb	2.20[a]	1.97[b]	2.01[b]	0.05

[abc]Means within a row with unlike superscripts differ (P < 0.01).
[de]Means within a row with unlike superscripts differ (P < 0.05).

Table 2. Feedlot performance of steers in the control (CON) and treatment (TRT) groups using year as random variable.

Item	CON	Adj.[a]	TRT	Adj.[a]	SEM
Number of Steers	127		132		
Days on Feed	211[c]	171	90[d]	72	5
Initial Feedlot wt.,lb	496[c]		977[d]		9
ADG, lb	3.31[e]		4.31[f]		0.16
Final Weight, lb[b]	1193[e]	1061	1364[f]	1286	33
DMI, lb	18.9[c]		30.7[d]		1.0
F:G	5.78[c]		7.29[d]		0.15

[a]Data adjusted to 28% Empty Body Fat.
[b]Calculated from hot carcass weight adjusted to a 63% dressing percentage.
[cd]Means within a row with unlike superscripts differ (P < 0.01).
[ef]Means within a row with unlike superscripts differ (P < 0.05).

Table 3. Adjusted and actual carcass data of control (CON) and treatment (TRT) steers adjusted to 28% empty body fat using year as a random variable.

	Adjusted			Actual		
Item	CON	TRT	SEM	CON	TRT	SEM
Number of Steers	127	132		127	132	
Hot Carcass Weight, lbs	668[b]	810[c]	21	752[b]	860[c]	21
Ribeye Area, in[2]	10.78[b]	12.68[c]	0.24	11.59[b]	13.05[c]	0.23
Fat, in	0.538	0.502	0.015	0.638[b]	0.548[c]	0.018
Yield Grade	2.8	2.8	0.1	3.2[b]	2.9[c]	0.1
Marbling Score[a]	530[b]	467[c]	16	588[b]	493[c]	16

[a]Marbling score: 500 = Small[00] (low Choice).
[bc]Means within a row with unlike superscripts differ (P < 0.05).

Results

The amount of grain left in the stalk fields after harvest was less than a bushel per acre in each of the three years that TRT cows grazed corn residue. The TRT cows grazed corn residues for an average 91 days each year.

Cow weights and BCS were similar at weaning and before corn stalk grazing in all three years. In years 1 and 3, weights after corn stalk grazing were greater (P < 0.01) for CON cows (yr 1 = 1242 lb; yr 3 = 1291 lb) than for TRT cows (yr 1 = 1165 lb; yr 3 = 1199 lb).

BCS was also greater ($P < 0.01$) in years one and three for CON cows (yr 1 = 5.7; yr 3 = 5.3) than for TRT cows (yr 1 = 5.3; yr 3 = 4.7). Despite differences in cow weight and BCS after corn stalk grazing, pregnancy rates were not different (CON = 91%; TRT = 93%).

The wintering period for TRT steers averaged 197 days, and steers gained an average of 1.16 lb/day during this period (Table 1). ADG for the summering period was considerably higher and averaged 2.20 lb/day in year 1, 1.97 lb/day in year 2, and 2.01 lb/day in year 3. The average spring/summer grazing period was 118 days. The higher gains realized during the summering period were likely due to compensatory growth, as observed previously (*2002 Beef Cattle Report,* pp. 25-29).

Actual and adjusted feedlot performance data are summarized in Table 2. Steer post-weaning weights were similar between treatments (CON = 496 lb; TRT = 503 lb). During the finishing phase, CON steers averaged 211 DOF and TRT steers averaged 90 DOF. When DOF were adjusted so that carcasses were 28% empty body fat, DOF was 171 days and 72 days for CON and TRT steers respectively. CON steers had lower ($P < 0.05$) ADG compared to TRT steers. DMI and F/G were also different ($P < 0.01$). F/G averaged 5.78 for CON steers and 7.29 for TRT steers. Previous researchers also observed lower feed intake and lower feed conversions in calf-feds when compared with yearlings (*2000 Nebraska Beef Cattle Report* pp. 20-22). Adjusted final weights were greater ($P < 0.05$) for TRT steers, and averaged 1286 lb compared to 1061 lb for CON steers.

Adjusted carcass data are summarized in Table 3. CON (668 lb) steers had lighter ($P < 0.05$) HCW compared to TRT (810 lb) steers. REA were also smaller ($P < 0.05$) for CON than TRT steers. FAT was similar for CON compared to TRT steers. CON (YG = 2.8; MARB = 530) steers had similar YG and higher ($P < 0.05$) MARB compared to TRT (YG = 2.8; MARB = 467) steers.

The results of the current study indicate differences in cow weight and condition after corn stalk grazing did not affect pregnancy rates. Growing steers for a longer period of time on forage before a short finishing period resulted in poorer feed conversion, leaner, heavier carcasses and more carcass weight marketed per cow. Because more product is marketed in the TRT compared to the CON system, there is greater potential for profit if costs are equal to or less than the costs incurred in the CON system. If costs are less in the TRT system, then value is added to the steer before the finishing phase using owned or locally owned grazing opportunities. The next step in this research is to compare the CON and TRT systems economically.

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