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Effect of Backgrounding Gain, Grazing Length and Dry Distillers Grain Consumption on Performance and Carcass Traits of June Born Cattle

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Summary

June-born cattle backgrounded at a lower rate during the winter were unable to fully compensate during summer grazing for restricted gain during backgrounding. Increased gain during backgrounding resulted in cattle being heavier for all market periods. The higher cost associated with increased gain was offset by heavier sale weights. Cattle grazing meadow regrowth had improved feedlot performance and heavier finished weight. Backgrounding cattle grazing winter range supplemented with DDG costs less than backgrounding cattle in a drylot. Supplementing with DDG during summer grazing decreased forage intake and increased gain, with 1.8 lb/head/day being more cost effective than 5 lb/head/day.

Introduction

Previous research from the University of Nebraska showed calves produced in a June calving system had lower production costs and higher net returns at weaning and harvest compared to cattle from traditional March calving (*2001 Nebraska Beef Cattle Report*, pp. 10-12). This same study also determined June born calves, marketed as finished cattle, generated greater returns when sold as finished yearlings compared to finished calf-feds but the growing period was not profitable as a stand alone enterprise. The objective of this study was to examine the performance from different winter backgrounding gains and summer grazing lengths. Our further objective was to examine how cattle in this study would be affected by the feeding of DDG during grazing. We hypothesized cattle backgrounded at a higher rate of gain would be heavier at sale time compared to lower backgrounding gains. Further, we hypothesized grazing meadow regrowth after a period of summer grazing would provide excellent ADG and economically increase BW.

Procedure

Crossbred steers (n = 39) and heifers (n = 46) were used in a 2 x 2 x 3 factorial arrangement of treatments in an unstructured experimental design, replicated over two years. The calves were born to heifers from a June calving herd at Gudmundsen Sandhills Laboratory (GSL). Forty-one calves were born in 2002, (year 1) and 44 were born in 2003, (year 2). Calves were weaned in November at GSL and the study began approximately 50 days later. Cattle were assigned randomly to one of four treatment combinations: winter backgrounding; LOW or HIGH and time spent grazing; SHORT or LONG.

Table 1. Least square means of animal performance and carcass data during backgrounding, range and meadow grazing and feedlot phases.

	Treatments						
	Low		High			*P*-values	
Item	Short	Long	Short	Long	SEM[a]	Background	Graze
Number of head	22	21	21	21			
Background							
Initial BW, lb	426	426	427	435	14	0.70	0.77
ADG, lb/day	1.39	1.51	2.36	2.44	0.06	< 0.001	0.08
DMI, lb	10.3	10.5	14.4	14.8	0.4	< 0.001	0.47
Feed/Gain	7.4	7.0	6.1	6.1	0.2	< 0.001	0.83
Days Fed	108	108	108	108			
Range							
Initial BW, lb	576	590	681	700	17	< 0.001	0.34
ADG, lb/day	1.44	1.46	0.98	1.06	0.05	< 0.001	0.27
Days Fed	100	100	100	100			
Meadow							
Initial BW, lb	—	734	—	805	17	< 0.001	—
ADG, lb/day	—	0.83	—	0.76	0.05	0.34	—
Days Fed	—	59	—	59			
Finishing							
Initial BW, lb	712	785	781	851	18	< 0.001	< 0.001
ADG, lb/day	3.42	3.98	3.44	4.19	0.12	0.33	< 0.001
Final BW lb[b]	1185	1258	1253	1348	27	0.004	0.002
DMI, lb	23.2	26.7	24.3	27.0	0.06	0.23	< 0.001
Feed/Gain	6.8	6.7	7.1	6.4	0.2	0.80	0.008
Days Fed	140	119	140	118			
Carcass data							
HCW, lb	746	792	790	849	17	0.004	0.002
Dress, %	62.5	62.6	63.8	63.6	0.3	< 0.001	0.81
Yield Grade	2.7	2.8	2.9	2.8	0.1	0.53	0.85
Fat Thickness, in	0.47	0.50	0.54	0.53	0.03	0.08	0.87
Internal Fat, %	2.0	2.1	2.1	2.2	0.1	0.19	0.10
Ribeye Area, in^2	13.2	13.6	13.8	14.6	0.3	0.007	0.03
Marbling Score[c]	598	620	613	624	18	0.61	0.36

[a]Greatest standard error of treatment means (SEM) reported.
[b]Hot carcass weight divided by 0.63 dressing percent.
[c]Marbling Score = Slight^0 = 400, Small^0 = 500, etc.

Table 2. Least square means of steer and heifer calves backgrounded at different rates and different lengths of range and meadow grazing.

	Sex			*P*-value
Item	Steers	Heifers	SEM[a]	Sex
Number of Head	39	46		
Background				
Initial BW, lb	441	416	10	0.08
ADG, lb/day	2.09	1.75	0.04	<0.001
DMI, lb	13.0	12.0	0.3	0.009
Feed/Gain	6.2	6.9	0.20	0.006
Range				
Initial BW, lb	667	606	13	< 0.001
ADG, lb/day	1.28	1.20	0.03	0.10
Meadow				
Initial BW, lb	794	725	12	< 0.001
ADG, lb/day	0.85	0.74	0.05	0.17
Finishing				
Initial BW, lb	821	743	13	< 0.001
ADG, lb/day	4.06	3.46	0.09	< 0.001
Final BW, lb	1337	1185	20	< 0.001
DMI, lb	26.7	23.9	0.4	< 0.001
Feed/Gain	6.6	6.9	0.14	0.10
Carcass data				
HCW, lb	842	746	12	< 0.001
Dress, %	63.4	62.9	0.2	0.12
Yield Grade	2.7	3.0	0.1	0.17
Fat Thickness, in	0.50	0.52	0.02	0.43
Internal Fat, %	2.2	3.1	0.05	0.42
Ribeye Area, in^2	14.6	13.0	0.2	< 0.001
Marbling Score[b]	586	642	13	0.003

[a]Greatest standard error of treatment means (SEM) reported.
[b]Marbling Score: 500 = choice minus, 600 = choice ave.

Average daily gain for backgrounding was designed to be 1 lb/head/day (LOW) and 2 lb/head/day (HIGH). Backgrounding was done in drylot at the West Central Research and Extension Center (WCREC) in North Platte, Neb. After backgrounding, cattle grazed Nebraska Sandhills range from May until September. At the end of summer grazing one-half of the cattle from each backgrounding treatment were either placed into the feedlot at WCREC for finishing (SHORT) or were returned to GSL for approximately 60 days to graze meadow regrowth (LONG). After grazing meadow regrowth, cattle returned to the WCREC feedlot for finishing. Beginning and ending weight for all production phases was determined from two consecutive day weighings after dry matter intake (DMI) had been restricted to 2.0% of BW for two days.

Distillers dried grains treatments were a simulated supplementation of: 0, 1.8 or 5 lb/head/day DDG to cattle grazing summer range and fall meadow. Effects from supplementing DDG were calculated using data from past University of Nebraska research (*2006 Nebraska Beef Cattle Report*, pp. 30-32 and pp. 33-35; *2007 Nebraska Beef Cattle Report*, pp. 17-19). Also, using this past research we analyzed LOW and HIGH cattle as if the cattle had been backgrounded on winter range and supplemented with sufficient DDG to produce the same ADG as the original LOW and HIGH treatments. The increased BW from DDG supplementation was added to the original ending BW. Data will be presented as if cattle had consumed DDG.

Animal performance and carcass traits were analyzed using the MIXED procedure of SAS (SAS Inst., Inc. Cary, N.C.). Animal starting weight was used as a covariate for analyzing performance and carcass data. The model included sex, backgrounding treatment, length of grazing and DDG intake. Experimental unit was animal for all data analyses.

Results

There were no statistical interactions among phases of the systems or with calf gender.

Background phase, (January-May)

LOW cattle had an ADG 0.95 lb less than HIGH ($P < 0.001$) making the LOW cattle 108 lb/head lighter (Table 1) at the end of the background treatment ($P < 0.001$). Daily gains of steers and ending weights were 0.34 ($P < 0.001$) and 61 ($P < 0.001$) lb greater than heifers, respectively (Table 2). Daily DMI was not different between steers and heifers and steers were more efficient than heifers ($P < 0.001$).

Summer phase, (June-September)

During the summer phase (Table 1) LOW cattle had an ADG 0.44 lb greater than HIGH cattle ($P < 0.001$). Increased gain for growth restricted cattle compared with nonrestricted during summer grazing was consistent with previous research. LOW cattle compensated for 39% of the backgrounding weight difference while on range. Compensatory gain decreased the weight difference between LOW and HIGH from 108 lb/head at the beginning of summer grazing to 65.5 lb/head by the end of summer grazing ($P < 0.001$).

Meadow phase, (September-November)

There were no significant differences in ADG on the meadow between treatments (Table 1). Ending weights were different, with HIGH being 69 lb/head heavier than LOW ($P < 0.001$). A lack of gain difference between treatments would indicate compensatory gain did not occur after September. Steers were heavier than heifers by 45 lb/head ($P < 0.001$; Table 2); however, the ADG difference between steers and heifers (0.1 lbs) was not significant ($P = 0.16$). Meadow gains from both years were less than expected. Possible reasons for the lower than expected gain and difference between years could be forage quantity. The analysis of meadow

(Continued on next page)

samples from this trial showed CP and TDN were less than reported previously. Though forage quality in year-1 of this study was higher than year-2; in year-1 the meadow was cut for hay later in the summer shortening the time available for regrowth. Based on data collected at GSL; precipitation in year-1 for July-October was 41.4% of the 1994-2004 average for those months. Precipitation in year-2 was 106% of the 1994-2004 average for July-October. With less precipitation and less regrowth time, forage quantity was likely decreased in year-1 compared to year-2, which decreased ADG below expectations.

Finish phase, (September-January), (November-February)

Daily gains for LONG cattle were 0.66 lb greater than SHORT cattle ($P < 0.001$; Table 1). There was no difference in ADG between LOW and HIGH treatments. Live finish weight was 79 lb/head greater for HIGH compared with LOW ($P < 0.001$). Because compensatory gain did not continue after summer grazing, HIGH cattle maintained all of their weight advantage over LOW from September through finishing. LONG cattle were 84 lb/head heavier than SHORT cattle ($P < 0.001$). Daily DMI were not different between LOW and HIGH treatment cattle ($P = 0.15$). LONG cattle had daily DMI 3.1 lb greater than SHORT ($P < 0.001$). LONG cattle had better feed efficiencies than SHORT ($P = 0.03$). With meadow gain restricted by a possible decrease in quantity of forage, greater BW, ADG, DMI and efficiency of LONG over SHORT may be explained by compensatory effect. Finish weight and ADG for steers were greater than heifers by 152 lb/head and 0.50 lb/head.day ($P < 0.001$; Table 2). Steers had 2.8 lb greater daily DMI ($P < 0.001$) and were more efficient ($P = 0.03$) than heifers.

Carcass data from USDA grading at the Tyson processing plant in Lexington, Neb. was used for analysis (Table 1). Of the 85 animals, 95% graded Choice or better and 95% were Yield grade 2 or 3.

Table 3. Effect of system on profitability.

	System				SEM
Item	Low	High	Short	Long	
Sept. P/L[a] $/head	67.86	74.66	70.33	72.13	8.28
Oct. P/L, $/head	43.60	47.68	—	45.64	20.40
Finish P/L, $/head	(0.72)	20.09	(8.08)	27.62	8.01
Finish[b] P/L, $/head	18.81	41.32	7.81	52.57	5.36
Finish[c] P/L, $/head	8.67	30.99	0.40	39.45	5.36

[a]P/L is profit (loss).
[b]With 1.8 lb DDG on grass.
[c]With 5 lb DDG on grass.

Table 4. Costs associated with backgrounding cattle at a HIGH vs LOW rate of gain compared to simulated costs associated with backgrounding at equivalent rates of gain using distillers dried grains and range.

	Treatment							
	LOW				HIGH			
	Short		Long		Short		Long	
	Drylot	DDG[b]	Drylot	DDG[c]	Drylot	DDG	Drylot	DDG
Background Costs, $								
Feed	51.15	42.53	51.48	42.99	69.30	62.41	71.79	64.41
Yardage	32.34	7.59	32.34	7.55	32.46	7.57	32.46	7.56
Health	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Interest	10.96	10.60	10.96	10.62	11.11	10.78	11.34	11.00
Total	102.45	68.72	102.78	69.16	120.87	88.76	123.59	90.97

[a]Greatest standard error treatment means (SEM) reported.
[b]DDG intake (2.9 lbs/head/day, DM).
[c]DDG intake (6.5 lbs/head/day, DM).

Carcass weights from LOW cattle were 51 lb/head less than HIGH cattle and carcass weights from SHORT treatment cattle were 53 lb/head less than LONG cattle ($P < 0.001$). Cattle on LOW had an average ribeye that was ($P = 0.05$) smaller than HIGH treatment cattle. There were no differences between LOW and HIGH for backfat, yield grade or internal fat. For graze treatments; SHORT had a smaller ribeye than LONG ($P = 0.03$). The larger ribeye for HIGH and LONG was due to heavier carcasses. Cattle on treatments SHORT and LONG had no differences for dressing percentage, yield grade, backfat thickness, or KPH ($P > 0.05$). Steers had 96 lb/head heavier carcass weights than heifers ($P < 0.001$). Yield grade for heifers was 0.33 higher than steers ($P = 0.02$) and ribeye area was greater for steers than heifers ($P < 0.001$). There were no significant differences between steers and heifers for the carcass traits; yield grade, dressing percentage, backfat thickness and internal fat (Table 2).

Dry distillers grains treatments simulation

Supplementation of DDGS during summer range and meadow grazing increased animal weight compared to no DDG supplementation for all production phases ($P < 0.05$). Supplementation of 1.8 lb/head/day DDG while cattle grazed summer range increased animal BW by 35 and 37 lb/head for LOW and HIGH, respectively. Supplementation of 5 lb/head/day DDG while grazing summer range increased animal BW by 42 and 44 lb/head for LOW and HIGH, respectively. DDG supplementation during meadow grazing at 1.8 lb/head.day increased BW by 22 and 24 lb for LOW and HIGH. Supplementation of 5 lb/head/day DDG during meadow grazing increased BW by 26 and 29 for LOW and HIGH. As stated, this increased weight was added to the original finished weight of each animal to provide the finished weights for DDG treatments. Final finish weights by treatment were increased

by 44, 53, 37 and 60 lb/head for LOW, HIGH, SHORT and LONG, respectively, at 1.8 lb/head/day DDG. Finished weights for DDG treatment 5 lb/head/day were increased by 49, 57, 44, and 71 lb/head for LOW, HIGH, SHORT and LONG, respectively.

Economics

Cattle were most profitable if sold off grass in September (Table 3). Higher rates of winter gain increased profit by $4.80 to $20.81 per head. Grazing meadow increased profit by $35.70 per head.

Feeding DDG on grass was profitable at all market times. Feeding 1.8 lb daily increased profit by an average of $16.15/head at finish. Feeding 5 lb daily increased profit by $10.15/head.

Compared to dry lot, feeding DDG on winter range decreased costs of backgrounding across all production systems (Table 4). Savings were about $33 per head. Use of DDG in both backgrounding and grazing situations increased profit by nearly $50 per head. Range in profit among the systems presented was large. Calves backgrounded at the low level and grazed for a short period were unprofitable while those backgrounded at a high rate on DDG supplement with DDG on grass, and with extended grazing on meadow had a profit of $52.57/head at finish. Steers were about $20/head more profitable than heifers.

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