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Grazing Supplementation and Subsequent Feedlot Sorting of Yearling Cattle

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Summary

Steers fed (0.6% BW) modified distillers grains plus solubles on the ground had increased ADG and BW at the end of summer grazing and were more profitable. Supplemented steers were fed 24 fewer days to reach feedlot harvest goal, had greater LM area, and lower marbling. Steers sorted on feedlot entry BW had increased HCW, marbling, and YG, but percentage overweight carcasses and profitability were similar. Steers supplemented during summer grazing had $11.80/animal greater overall profit.

Introduction

Co-products of the corn dry milling ethanol industry fit well into forage feeding programs because distillers grains are high in undegradable intake protein and provide a highly fermentable fiber source that does not negatively impact forage digestion. Sorting cattle on feedlot entry BW may successfully reduce carcass weight variation and overweight carcasses, which may be especially concerning when feeding heavier, later maturing animals.

The objectives of the study were to determine the impacts of supplementing modified distillers grains with solubles on the ground to long yearling steers on summer range and subsequent feedlot sorting on entry BW.

Procedure

Winter Phase

Each year of a three-year study, 240 crossbred steers (initial BW = 498 ± 44 lb) were backgrounded as a common group on cornstalk residue at the University of Nebraska–Lincoln Agricultural Research and Development Center (ARDC), Mead, Neb., from late fall to mid-spring (145 days). While grazing cornstalks, calves were supplemented 5.0 lb DM/animal/day of Sweet Bran®. After cornstalk backgrounding, steers were limit fed at 1.8% BW (DM) for five days. Initial BW for summer grazing was the mean of consecutive two-day BW measurements.

Summer Phase

On approximately April 15 each year, calves were implanted with Revalor® G, weighed, stratified by BW, and assigned randomly to one of two summer grazing treatments. Steers grazed smooth bromegrass pastures for approximately 23 days. Then, steers were transported to the University of Nebraska Barta Brothers Ranch to graze native Sandhills range where summer grazing treatments were applied (136 days). Summer grazing treatments included: 1) grazing native range with no supplementation (CON), and 2) grazing native range with modified distillers grains plus solubles (MDGS) supplementation at 0.6% BW (DM; SUPP). Supplement offered increased with increasing BW of SUPP animals and averaged 5.0 lb DM/animal/day over the grazing period. A tractor and feed wagon was used to feed MDGS on the ground six days/week.

Feedlot Phase

In late September, steers were transported to the ARDC, reimplanted with Revalor S, weighed (same procedure as above), stratified by BW, and assigned randomly to one of two feedlot sorting treatments within summer grazing treatments. Feedlot sorting treatments included: 1) cattle sorted three ways based on distribution of feedlot entry BW (25% light, 50% medium, 25% heavy; SORT); and 2) cattle not sorted (NOSORT). Upon arrival, steers were adapted to a common finishing diet. Within each summer grazing treatment-feedlot sorting treatment combination, steers were harvested when fat thickness was visually estimated to be constant (0.50 in).

Economic Analysis

An enterprise budget was created to illustrate economic implications of supplementation during summer grazing. Economic analyses were based on price averages from 2006 to 2010. Cattle purchase and sales prices for each phase of production were based on weekly weighted average prices for Nebraska sale barns. Cornstalk residue rental rates were included at $0.12/animal/day. Using the average regional pasture rental rate of $31.84/pair (1,300 lb), NRC energy equations to estimate forage DMI, and forage replacement of 17% for SUPP steers compared to CON steers; annual summer pasture rental rates were applied at $0.41/animal/day and $0.49/animal/day for SUPP and CON steers, respectively. Feed prices were as follows: corn ($3.74/bu DM + $0.05/bu DM for corn processing); MDGS ($111.69/ton DM; 75% corn

Table 1. **Performance and carcass characteristics of yearling steers supplemented MDGS on grass and sorted by weight into the feedlot in separate phases of production.**

	CON[1]		SUPP[2]			P-value[3]		
Item	NOSORT[4]	SORT[5]	NOSORT	SORT	SE[6]	S	F	S x F
Winter phase								
Initial BW, lb	500	497	499	498	6	0.71	0.79	0.52
Ending BW, lb	696	698	695	699	5	0.92	0.14	0.71
ADG, lb	1.41	1.44	1.42	1.44	0.06	0.74	0.14	0.68
Summer phase[7]								
Ending BW, lb	914[a]	916[a]	1021[b]	1020[b]	12	<0.01	0.90	0.61
ADG, lb	1.36[a]	1.36[a]	2.04[b]	2.01[b]	0.07	<0.01	0.55	0.56
Feedlot phase[8]								
DOF	126[a]	133[b]	102[c]	111[d]	1	<0.01	<0.01	<0.01
DMI, lb	30.4[a]	30.1[b]	30.3[a]	29.5[b]	0.5	0.16	0.02	0.24
ADG, lb	4.00	3.98	3.95	3.80	0.26	0.07	0.17	0.29
F:G	7.81	7.78	7.99	8.01	0.48	0.11	0.97	0.82
HCW, lb	894[a]	911b	897[a]	906[b]	13	0.92	0.01	0.41
LM, in^2	13.65[a]	13.60[a]	14.03[b]	13.90[b]	0.25	0.01	0.46	0.74
FT, in	0.49	0.52	0.49	0.50	0.03	0.57	0.21	0.57
MB[9]	596	630	559	556	13	<0.01	0.05	0.02
YG[10]	3.26	3.40	2.96	3.15	0.16	<0.01	0.02	0.76

[a,b,c,d]Means without a common superscript differ (P < 0.05).
[1]CON = cattle grazing native range during the summer with no supplementation.
[2]SUPP = cattle grazing native range during the summer with modified wet distillers grains with solubles supplementation at 0.6% BW.
[3]*P*-Value: S = effect of summer grazing treatment; F = effect of feedlot sorting treatment; S x F = effect of treatment interaction.
[4]SORT = cattle sorted on feedlot entry BW.
[5]NO SORT = cattle not sorted.
[6]Pooled standard error of treatment means.
[7]Summer Phase = 23 days grazing brome grass + 136 days grazing native range; Initial BW = Ending BW from previous phase.
[8]Initial BW = Ending BW from previous phase.
[9]Small^{00} = 500.
[10]Calculated yield grade = (2.5 + (2.5 x FT) - (0.32 x LM) + (0.2 x 2.5 KPH) + (0.0038 x HCW)).

price); Sweet Bran ($132.21/ton DM; 95% corn price); supplement ($190.00/ton DM); and alfalfa hay ($90.30/ton DM). Veterinary and processing fees charged were $8.33/animal for each production phase. A common yardage value was included at $0.25/animal/day for all animals during the winter phase, yardage for CON steers was included at $0.10/animal/day during the summer phase, yardage for SUPP steers was included at $0.20/animal/day during the summer phase, and a common yardage value was included at $0.45/animal/day for all animals during the feedlot phase. The additional yardage assigned to SUPP steers over CON steers during summer grazing accounted for supplement delivery. An average death loss of 0.79% was charged, weighted by phase of production. Distances used to determine transportation fees remained constant across treatments, but weight transported reflected treatment averages. Marketing and risk management costs were assumed to be $0.25/cwt for each production phase.

Agricultural operating loan interest rates from the Federal Reserve Bank of Kansas City averaged 7.61% for Nebraska. Because SUPP steers were heavier entering the feedlot after summer grazing than CON steers, a $5.10/cwt price slide was used to adjust the price of steers at feedlot entry. Fed cattle sales price was included at $137.90/dressed cwt. CON NOSORT steers were considered the most traditional group of long yearlings in this system and served as control; thus, feeder cattle price at entry into the winter phase was adjusted to produce a $0.00 profit (breakeven). Profit or loss was calculated for each production phase and for the overall system by subtracting cost of production from animal sales price.

The experiment was a completely randomized design with treatments arranged in a 2 x 2 factorial design. Data were analyzed using the GLIMMIX Procedure of SAS (SAS Inst., Inc., Cary, N.C.) as a completely randomized design with 30 animal groups as the experimental unit. Summer grazing treatments and feedlot sorting treatments were considered fixed effects and year was considered a random effect. Probability values less than 0.05 were considered significant.

Results

Data collected in winter, summer, and feedlot phases are summarized in Table 1. By experimental design, initial BW, ending BW, and ADG during the winter phase were not different between SUPP and CON steers. At feedlot entry, SUPP steers were 106 lb heavier ($P < 0.01$) than CON steers. Therefore, SUPP steers had 0.66 lb/d greater ($P < 0.01$) ADG than CON steers during summer grazing. Because feedlot harvest date was targeted to equal fat thickness between CON and SUPP steers, 12th rib fat thickness (FT) was not different between the two treatments. Final BW was similar between CON and SUPP steers; however, it required 24 fewer ($P < 0.01$) d in the feedlot for SUPP

(Continued on next page)

steers to reach this point. Feedlot ADG tended to be greater ($P = 0.07$) for CON steers than SUPP steers, but F:G and DMI were not different .

Longissimus muscle area (LM) was greater ($P = 0.01$) for SUPP steers. Protein analyses of diet samples collected from nearby summer pastures where the yearlings were maintained, indicated CON steers were deficient in ruminally degradable protein in August and September. Because MDGS was fed in excess of metabolizable protein requirements, urea recycling likely supplied sufficient ruminally degradable protein to SUPP steers. Unsupplemented steers had greater ($P < 0.01$) marbling score (MB), likely due to the longer time spent on feed in the feedlot phase. Calculated yield grade (YG) was also greater ($P < 0.01$) for CON steers than SUPP steers.

As expected, BW and ADG were not different for SORT steers compared to NOSORT steers in the winter and summer phases of production. However, sorting cattle on feedlot entry BW resulted in 14 lb greater ($P < 0.01$) HCW for SORT steers than NOSORT steers, likely because SORT steers were in the feedlot 8 d longer ($P < 0.01$). Similarly, SORT steers had greater ($P = 0.02$) DMI than NOSORT steers; but ADG and F:G were similar. Although LM and FT were not different between the two sort treatments, SORT steers had greater ($P < 0.05$) MB and YG than NOSORT steers. These differences may also be explained by the longer time SORT steers spent on a finishing diet in the feedlot phase of production when compared to their NOSORT contemporaries. Sorting cattle on feedlot entry BW did not reduce the percentage carcasses over 1,000 lb; however, a 2.4% numerical reduction in overweight carcasses was observed (Figure 1).

Profitability was similar between CON ($39.63/animal) and SUPP ($40.62/animal) steers during the winter phase of production (Figure 2). Additional BW gain during summer grazing caused profitability for SUPP steers to be $9.81/animal greater ($P = 0.02$) than CON steers. Numerical losses in the feedlot for SUPP steers were $1.05/animal less compared to CON steers. When the entire yearling production system was analyzed, SUPP steers were $11.80/animal more profitable ($P = 0.05$) than CON steers. Sorting cattle on feedlot entry BW did not increase profitability in the feedlot phase when cattle were sold, likely due to similar HCW and FT for sorting treatments.

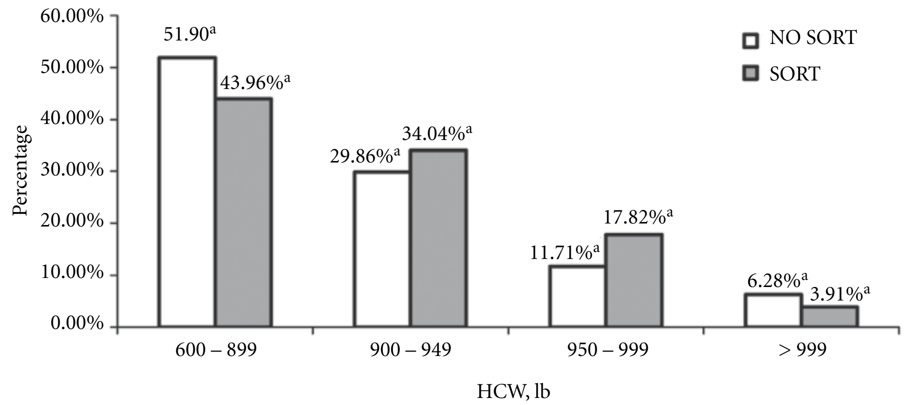

Figure 1. Carcass weight frequencies of yearling steers sorted by feedlot entry BW or not sorted. Means without a common superscript differ ($P < 0.05$). NO SORT steers were not sorted on feedlot entry BW. SORT steers were sorted on feedlot entry BW.

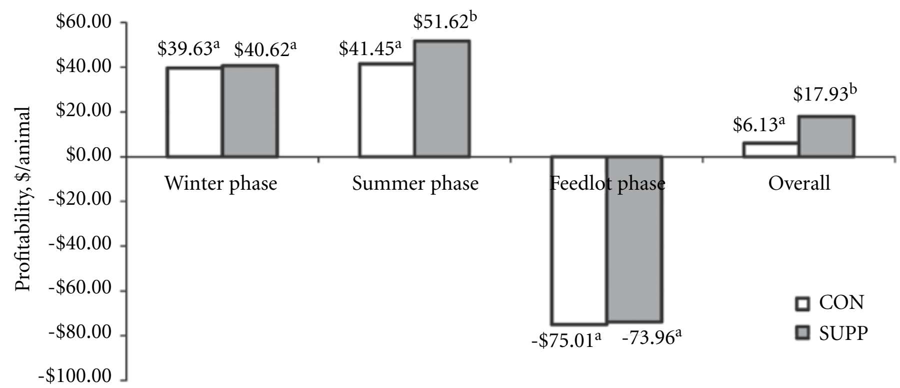

Figure 2. Profitability of each phase of production of yearling steers supplemented MDGS on grass. Means without a common superscript differ ($P < 0.05$). Winter phase profitability assessed over 145 days grazing cornstalk residue. Summer phase profitability assessed over 23 days grazing bromegrass + 136 days grazing native range. Feedlot phase profitability assessed over 118 days in feedlot on common finishing diet. Overall profitability assessed over winter, summer, and feedlot phases. CON steers grazed native range during the summer with no supplementation. SUPP steers grazed native range during the summer with modified wet distillers grains with solubles supplementation at 0.6% BW.

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