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INFLUENCE OF POTASSIUM SPIKING ON MARKETING SHRINK AND CARCASS CHARACTERISTICS OF FEEDLOT STEERS

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ABSTRACT: Ninety-six calf-fed crossbred steers (437 kg) were used to evaluate the influence of potassium spiking during the final 7 d before slaughter on marketing shrink and carcass characteristics. Forty days prior to slaughter steers were blocked by weight and assigned to 16 pens (6 steers/pen), 8 pens/treatment. Steers were fed a 78% steam-flaked corn-based finishing diet containing .80% potassium (DM basis). "Spiking" consisted of increasing the dietary potassium level to 1.30%, using potassium chloride. On the final d of the trial, steers were individually weighed, and then transported 352 kilometers for slaughter. The time interval between shipment and slaughter was approximately 6 h. Daily weight gain (kg), DM intake (kg), and feed efficiency during the final 40-d finishing period were not different (P > .20) for the treatment groups, averaging 1.28, 7.87, and 6.60, respectively. Based on observed NE intake, ADG was 104% of expected. Potassium spiking decreased (6.2%, P = .05) DM intake (5.30 vs 4.98) during the last 7 d prior to slaughter. But did not influence (P > .20) carcass weight (320 vs 321 kg), dressing percentage (65.2 vs 65.7), KPH (3.19 vs 3.15), fat thickness (1.10 vs 1.12), longissimus muscle area (80.4 vs 80.5), marbling score (4.5 vs 4.3), or retail yield (51.5 vs 51.5). We conclude that increasing the dietary potassium level (potassium spiking) during the final week before slaughter may not be an effective means of augmenting carcass yield.

Key Words: Potassium, Cattle, Carcass

Introduction

Potassium is the principal intracellular cation, and as such, functions in the maintenance of cellular water balance. Marketing stresses associated with shipping and handling prior to slaughter may incur potassium loss and tissue shrink, presumably due to stress related hyperactivity of the adrenal cortex. The objective of this study was to evaluate the influence of potassium spiking (feeding an additional 1% potassium chloride) during the final 7 d before slaughter on marketing shrink and carcass characteristics of feedlot steers.

Experimental Procedure

Forty days before slaughter, 96 calf-fed crossbred steers (437 kg, initially) were blocked by weight and randomly assigned within weight groups to 16 pens (six steers per pen). Pens were 43 m^2 with 22 m^2 overhead shade. The trial was initiated November 12, 1997. Treatments consisted of a basal finishing diet supplemented with 0 or 1% potassium chloride. The basal diet was comprised of (DM basis) 77.70% steam-flaked corn, 4.00% alfalfa hay, 6.00% sudangrass hay, 2.00% yellow grease, 7.00% cane molasses, 1.00% urea, 1.75% limestone, .15% magnesium oxide, .40% trace mineralized salt, and 11 mg/kg laidlomycin. Nutrient composition of the basal diet was (DM basis): 2.21 Mcal/kg NE_m, 12.0% CP; .80% Ca; .28% Mg; .28% P and .77% K. All steers were fed the basal diet until 7 d before slaughter. Subsequently, the diets fed to 8 of the 16 pens of cattle were "spiked" with an additional 1% potassium chloride (as fed basis). Diets were prepared at approximately weekly intervals and stored in plywood boxes located in front of each pen. Steers had ad libitum access to their diet. Fresh feed was added twice daily. On the final d of the trial, steers were individually weighed, and then transported 352 kilometers for slaughter. The time interval between shipment and slaughter was approximately 6 h. Hot carcass weights were obtained from all steers at time of slaughter. After the carcasses were chilled for 48 h the following measurements were obtained: 1) longissimus muscle area (ribeye area), taken by direct grid reading of the eye muscle at the twelfth rib; 2) subcutaneous fat over the eye muscle at the twelfth rib taken at a location 3/4 the lateral length from the chine bone end; 3) kidney, pelvic and heart fat (KPH) as a percentage of carcass weight and 4) marbling score (USDA, 1965). For calculating steer performance, initial and final full weights were reduced 4% to account for digestive tract fill. Energy gain (**EG**) was calculated by the equation: $EG = (.0557BW^{.75})ADG^{1.097}$, where EG is the daily energy deposited (Mcal/d), ADG is weight gain (kg/d) and BW is the mean body weight (kg; NRC, 1984). Maintenance energy expended (Mcal/d, EM) was calculated by the equation: $EM = .077W^{.75}$ (Lofgreen and Garrett, 1968). Based on estimates of EM and EG, the NE_m and NE_g value of the diets were obtained by means of the quadratic formula ($x' \frac{\&b \pm \sqrt{b^2 \& 4ac}}{2c}$) where a = -.41EM, b = .877EM + .41DMI + EG, c = -.877DMI, and $NE_g = .877NE_m - .41$. The trial was analyzed as a randomized complete block design experiment (Hicks, 1973).

Results and Discussion

Treatment effects on steer performance is shown in Table 1. Daily weight gain (kg), DM intake (kg), and feed efficiency during the final 40-d finishing period were not different (P > .20) for the treatment groups, averaging 1.28,

7.87, and 6.60, respectively. Based on observed NE intake, ADG was 104% of expected. Potassium spiking decreased (6.2%, P = .05) DMI during the last 7 d prior to slaughter. In a previous study (Zinn and Owens, 1980), increasing dietary potassium from .66 to 1.16% (by the addition of 1% potassium chloride) during the last 28 d before slaughter increased ADG and feed efficiency by 6 and 10%, respectively.

Treatments effects on carcass characteristics is shown in Table 2. Potassium spiking did not influence (P > .20) carcass weight, dressing percentage, KPH, fat thickness, longissimus muscle area, marbling score, or retail yield.

The trends in growth performance and carcass yield with potassium spiking were numerically consistent in magnitude with expectations. However, the variability in growth performance measures in this study were high. Because there are many extraneous factors that can affect measures of growth performance when taken over so short an interval, more replications are needed to test treatment effect.

Implications

Increasing the dietary potassium level (potassium spiking) during the final week before slaughter may not be an effective means of augmenting carcass yield.

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Table 1. Influence of potassium spiking during the last 7 d before slaughter on last 40-d performance of feedlot steers.

Item	Control	Spiked[a]	SEM
Pen replications	8	8	
Weight, kg			
Initial	438	437	5
Final[b]	489	490	6
ADG, kg	1.24	1.31	.12
DMI, kg			
1-40 d	7.86	7.88	.20
Last 7 d[c]	5.30	4.97	.15
Feed/gain	6.76	6.43	.77
Diet NE			
Maintenance	2.26	2.34	.14
Gain	1.57	1.64	.13
Observed/Expected NE			
Maintenance	1.02	1.06	.06
Gain	1.03	1.07	.08

[a]During the last 7 d before slaughter 1% potassium chloride was added to the basal diet.

[b]Adjusted for carcass weight.

[c]Treatments differ, P = .05.

Table 2. Influence of potassium spiking during the last 7 d before slaughter on carcass characteristics.

Item	Control	Spiked[a]	SEM
Carcass weight, kg	320	321	
Dressing percentage	65.2	65.7	.6
KPH, %	3.19	3.15	.13
Fat thickness, cm	1.10	1.12	.12
Longissimus area, cm^2	80.4	80.5	1.9
Marbling score[b]	4.53	4.31	.22
Retail yield, %[c]	51.57	51.5	.4

[a]"Spiking" consisted of increasing the dietary potassium level to 1.30%, by the addition of 1%potassium chloride to the basal diet.

[b]Coded: minimum slight = 3.0, minimum small = 4.0, etc.

[c]Boneless closely trimmed retail cuts from the round,

loin, rib and chuck as a percentage of carcass weight.