Effect of Liquid Feed Supplementation During Winter Grazing on Subsequent Feedlot Performance and Carcass Characteristics of Yearling Steers

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Story in Brief

Forty crossbred yearling steers (679 ± 32 lb) were used to determine the effect of liquid supplementation during the fall and winter on grazing performance and subsequent feedlot performance and carcass characteristics. Uniform groups of 10 steers were assigned to one of four pastures with abundant native tall grass forage. Two groups had free-choice access to a 32% crude protein liquid supplement (Liquid) and two groups of steers were not supplemented (Control) from October 2, 2001 through January 11, 2002 (101 d). Supplement intake averaged 2 lb per day and increased from 1.4 lb per day in early October to 2.6 lb per day in early January. During the grazing phase, Liquid fed steers maintained their body weight while Control steers lost 32 lb. Feedlot performance and carcass characteristics did not differ among the treatment groups. As a result, Liquid fed steers maintained a 22 lb live weight and a 13 lb carcass weight advantage compared with Control steers.

Key Words: Beef Cattle, Liquid Supplements, Grazing, Feedlot, Carcass

Introduction

Cattle grazing dormant native warm season grasses require protein supplementation to maintain body weight during fall and winter. In a recent experiment (Bodine et al., 2001), steers winter grazing native warm season pasture gained .86 lbs per day when supplied with .4% of body weight soybean meal, while cattle receiving no supplement lost .37 lbs per day. Due to the low margin nature of the cattle business, large stocker cattle operations must minimize capital equipment and labor inputs. Liquid feed supplementation programs require minimal labor and capital investment, but have not been examined thoroughly for their potential to enhance stocker cattle performance during the dry wintering period. Therefore, the objectives of this experiment were to determine the effects of a liquid supplement on fall and winter grazing performance of yearling steers and subsequent feedlot performance and carcass characteristics.

Materials and Methods

The grazing phase of this experiment was conducted at the OSU Range Cow Research Center, North Range Unit, located 12 miles west and 3 miles north of Stillwater, OK. The forty steers (679 ± 32 lbs) used in this experiment were sired by South Devon or Angus bulls and produced by Angus or Hereford sired cows. Steers were born during September and October, 2000 and weaned during May, 2001. Steers grazed native tall grass prairie pastures with no supplementation after weaning. On July 31, steers were implanted with Component® E-S and treated for internal parasites with Dectomax®. On October 2, steers were retreated with Dectomax®, weighed and assigned to one of two weight blocks and randomly allotted to treatment within weight block. Treatments consisted of no supplement (Control) or free-choice

access to a commercial 32% protein liquid supplement (Liquid Supplement). Composition of the liquid supplement is shown in Table 1. The supplement treatment period ended on January 11, for a total treatment period of 101 d. No hay was fed at any time throughout the grazing phase of this experiment.

Table 1. Chemical composition of liquid supplement, as fed basis

Item	Concentration
Dry Matter	61
Crude Protein	34.7
NPN, crude protein equivalent, %	22.8
Phosphorus	1.0
Potassium	2.5
Magnesium	.3
Copper, ppm	72
Zinc, ppm	127
Total Invert Sugars, %	26.3
pH	4.2

Each of the four groups of steers was assigned to one of four 80-acre native tall grass prairie pastures. The pastures had not been grazed since May and had an average initial standing crop of 3,065 ± 678 lbs per acre. Cattle and feeders (for supplemented groups) were rotated through the pastures on an every-other-week basis in order to minimize pasture effects.

Forage quality was estimated during the scheduled weigh dates. Three forage sampling sites were selected within each pasture and marked with a highly visible post. On each sampling date, forage samples were hand plucked within a 10 ft radius of the post.

In order to determine total liquid feed consumption for each pasture, liquid supplement was weighed prior to being pumped into feed tanks and residual feed was weighed at the termination of the grazing phase. Liquid volume in the feed tanks was monitored weekly in order to estimate weekly feed consumption.

On January 11, steers were gathered in the early morning, weighed and shipped to the Willard Sparks Beef Research Center, located near Stillwater, OK. Upon arrival, steers were processed and allotted to one of eight pens (4 pens/treatment, 5 steers/pen). Processing included vaccination with Frontier® 4 plus, treatment for internal and external parasites using Ivomec-Plus® injectable, and implanting with Synovex S® in the right ear. Steers were fed a high-concentrate diet consisting of 77% corn, 8% alfalfa hay, 10% supplement, 3% fat, and 2% cottonseed hulls. This diet was formulated to meet or exceed NRC (1996) requirements for finishing steers. The cattle were fed twice daily at 0700 and 1400. Feed was mixed in a Rotomix® mixer, weighed into tubs and hand-fed on an individual pen basis. On November 27 (d 56), steers were reimplanted with Revalor S®. Steers were harvested on May 22 after 131 d on feed. Initial weight was analyzed as taken, whereas all interim weights were analyzed with a 4% pencil shrink. Final live weight was calculated by dividing hot carcass weight by a common dressing percentage (60%). Feed intake was measured and feed efficiency (DMI:ADG) was calculated every 28 d. Hot carcass weight was determined following harvest, and carcasses were evaluated after a 24-h chill for subcutaneous fat depth at the twelfth rib, longissimus muscle area,

percentage kidney, pelvic, and heart fat, yield grade, marbling score, and quality grade (USDA, 1997).

Change in liquid feed intake over time was determined by regressing average daily intake for each week (calculated using the mean of the two Liquid pasture groups) on week of the experiment. Individual animal was considered to be the experimental unit for grazing performance and carcass characteristics. Feedlot pen was considered to be the experimental unit for feedlot daily gain, dry matter intake of the finishing diet and feed conversion.

Results and Discussion

Liquid feed intake averaged 2.05 ± .70 lb per head per day, although liquid intake increased over time in a linear fashion ($P < 0.05$; Figure 1). The regression line shown in Figure 1 indicates that average daily liquid supplement consumption increased at the rate of 0.09 ± 0.04 lbs per week. Animal performance progressively declined through early January for both treatment groups (Table 2). Cattle receiving liquid supplement gained at a faster rate ($P = .06$) during the month of October and lost less weight during December and early January ($P = .03$). Overall, Liquid supplemented steers maintained their initial weight, while Control steers lost 32 lb ($P < .01$).

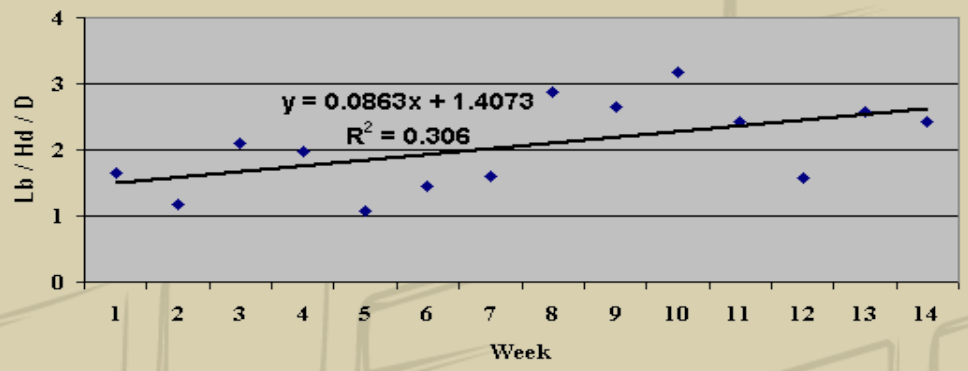

Figure 1. Average daily liquid supplement intake by week during the grazing phase.

Table 2. Effects of liquid supplement on weight and daily weight change of steers grazing native tall grass prairie pasture during fall and winter.

	Control	Liquid Supplement	SEM	P - value
Weight, lb.				
Oct. 2	680	679	7.2	.91
Oct. 30	716	724	6.6	.44
Nov. 27	709	721	7.6	.27
Jan. 11	648	676	7.5	.01
Daily weight change, lb.				
Oct. 2 – Oct. 30	1.29	1.59	.11	.06
Oct. 30 – Nov. 27	-.27	-.10	.18	.50
Nov. 27 – Jan. 11	-1.34	-.99	.11	.03
Overall	-.32	-.03	.05	< .01

Due to the liquid supplement program, Liquid steers had heavier weights (P=.06) at the beginning of the feed finishing phase. During the finishing phase, winter grazing treatment did not influence daily weight gain, dry matter intake or feed conversion (Table 3). As a result, Liquid steers had heavier live weights and carcass weights at harvest, although differences were not statistically significant. There were no significant differences among treatments for other carcass characteristics measured.

Implications

Liquid feed supplementation improved performance of cattle grazing native tall grass prairie during fall and winter and this weight advantage was maintained through the finishing phase.

Table 3. Effects of liquid feed supplementation during winter grazing on feedlot performance and carcass characteristics.

	Control	Liquid Supplement	SEM[a]	P - value
No. Steers	20	20		
Weight, lb				
Initial	648	676	17.2	.06
131-d	1233	1255	22.9	.50
Daily gain, lb	4.47	4.42	.15	.83
DM intake, lb/d	20.7	21.3	.50	.43
Feed efficiency	4.64	4.84	.17	.45
Carcass weight, lb	740	753	13.7	.50
Dressing percent	60.5	63.1	1.77	.30
Fat thickness	.41	.48	.03	.14
REA	13.0	13.3	.28	.48
YG	2.6	2.8	.12	.40
Marbling[b]	371	377	15.5	.79
KPH	2.4	2.3	.16	.50

[a] Standard error of the least squares means

[b]100=Practically Devoid; 200=Traces; 300 Slight; 400=Small; 500= Modest; 600=Moderate; 700=Slightly Abundant; 800=Abundant

Literature Cited

Bodine et al. 2001. Okla. Agr. Exp. Sta. Res. Rep. P-958:11.

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