Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 1 *Cattleman's Day (1993-2014)*

Article 538

1997

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Abstract

Sixteen ruminally fistulated steers were used to evaluate the effects of altering supplementation frequency and including urea in dry supplements on forage intake and digestion. Intake of low-quality tallgrass-prairie hay was not affected by supplementation frequency or by the inclusion of urea. Supplementing cattle less frequently resulted in a decrease in diet digestion. However, we observed a slight trend for reduced supplementation frequency to exert a greater impact when cattle were fed supplements that contained urea.

Keywords

Cattlemen's Day, 1997; Kansas Agricultural Experiment Station contribution; no. 97-309-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 783; Beef; Steers; Forage; Urea; Supplementation frequency; Intake; Digestibility

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THE EFFECTS OF SUPPLEMENTATION FREQUENCY AND AMOUNT OF UREA IN DRY SUPPLEMENTS ON INTAKE AND DIGESTIBILITY OF LOW-QUALITY TALLGRASS-PRAIRIE FORAGE BY BEEF STEERS [1]

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Summary

Sixteen ruminally fistulated steers were used to evaluate the effects of altering supplementation frequency and including urea in dry supplements on forage intake and digestion. Intake of low-quality tallgrass-prairie hay was not affected by supplementation frequency or by the inclusion of urea. Supplementing cattle less frequently resulted in a decrease in diet digestion. However, we observed a slight trend for reduced supplementation frequency to exert a greater impact when cattle were fed supplements that contained urea.

(Key Words: Steers, Forage, Urea, Supplementation Frequency, Intake, Digestibility.)

Introduction

Because of the higher costs associated with true protein use in winter supplements, producers have been interested in the use of urea as a substitute for a portion of the degradable intake protein (DIP) present in supplements. Also large-scale supplementation of cattle may entail the feeding of supplements on a less than daily schedule. Previous research at Kansas State University indicates that urea can replace up to 30% of the supplemental DIP in dry supplements with little effect on forage intake and digestion or livestock performance. Similarly, research conducted on supplementation frequency indicated that dry supplements that do not contain urea can be fed on a less than daily schedule without adverse effects on performance. The objective of our study was to evaluate whether urea inclusion in winter range supplements would alter the response to changing supplementation frequency.

Experimental Procedures

Sixteen Hereford x Angus steers (average BW = 555 lb) with ruminal fistulas were housed in individual tie stalls and had ad libitum access to low-quality tallgrass-prairie hay (5.6% CP, 68.4% NDF). Steers were assigned to treatments consisting of two supplementation frequencies (daily and alternate day) and inclusion of urea at 30% of the DIP or no urea. Supplements were formulated to contain 30% CP (approximately 70% of the CP was DIP) and were composed of rolled sorghum grain, soybean meal, urea (30% treatment only), dry molasses, and minerals. The amount of supplement fed (as-fed basis) was .46% of BW/daily or .92% of BW every other day. Based on previous research, the amount of supplement fed should have provided sufficient DIP to maximize forage intake. Supplements were fed in the early morning, and complete supplement consumption generally occurred within 45 minutes. Animals were adapted to the diets for 14 days followed by a 6-day fecal collection period during which feed offered, feed refused, and fecal output were recorded.

Results and Discussion

Forage organic matter (OM) intake and total OM intake were not affected ($P>.57$) by frequency of supplement feeding or urea inclusion in the supplement (Table 1). Similarly, including urea in the supplement, when

[1]The authors express their appreciation to Gary Ritter and Wayne Adolph for their assistance in conducting this experiment.

considered on its own, did not significantly affect OM or neutral detergent fiber (NDF) digestion. Digestion of OM and NDF was depressed ($P \leq .06$) by supplementing less frequently. However, there was a slight tendency ($P=.13$ for OM and $P=.19$ for NDF digestion) for supplementation frequency to interact with urea inclusion in the supplement. In general, cattle fed the supplement that contained 30% of the DIP from urea responded more dramatically to changes in supplementation frequency than did those fed supplements without urea.

Supplement refusal can be a problem with dry supplements, if urea is included at a high level. With feeding every other day, some steers in this trial were given as much as 5.8 lb (as fed) to consume in a single feeding (.92% of BW). In general, supplement consumption was not a problem, but we observed a trend, over time, for steers fed the largest amount of supplement on alternate days to refuse some of the supplement, although the amount was seldom more than .25 lb. In these cases, the supplement was placed directly into the rumen to ensure a legitimate comparison of supplement effects on intake and digestion. In conclusion, intake of low-quality tallgrass-prairie hay was not affected by supplementation frequency or by low-level inclusion of urea in a dry supplement. However, digestion may be somewhat lower for cattle supplemented less frequently. This may be particularly true when a dry supplement contains part of its DIP in the form of urea.

Table 1. Effect of Supplementation Frequency and Inclusion of Urea as a Portion of the Supplement DIP on Intake and Digestion

	With Urea		Without Urea			Contrasts[a]		
	Alternate		Alternate					
Item	Day	Daily	Day	Daily	SE	U	F	U×F
Forage OM[b] intake, g/kg BW $^{.75}$	69.0	66.7	67.4	70.8	5.2	.81	.91	.60
Forage OM intake, % BW	1.73	1.67	1.70	1.78	.13	.78	.94	.61
Supplement OMI, g/kg BW $^{.75}$	15.1	15.1	15.1	15.1	.05	.72	.39	.91
Supplement OM intake, % BW	.38	.38	.38	.38				
Total OM intake, g/kg BW $^{.75}$	83.3	81.9	81.5	86.2	5.1	.81	.76	.57
Total OM intake, % BW	2.09	2.05	2.06	2.17	.13	.77	.79	.57
OM digestibility, %	58.9	66.1	60.9	62.6	1.7	.66	.03	.13
NDF[b] digestibility, %	53.7	62.3	55.2	57.0	2.4	.47	.06	.19
Digestible OM intake, g/kg BW $^{.75}$	48.9	54.1	49.7	53.8	3.4	.96	.21	.88
Digestible OM intake, % BW	1.23	1.36	1.25	1.35	.09	.92	.21	.88

[a]Probability of a greater F value. U = urea, F = frequency, U×F = urea by frequency interaction.
[b]OM = organic matter; NDF = neutral detergent fiber.