

Kansas Agricultural Experiment Station Research Reports

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

Article 778

1992

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J.L. Beaty

R.C. Cochran

B.A. Lintzenich

See next page for additional authors

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Recommended Citation

Beaty, J.L.; Cochran, R.C.; Lintzenich, B.A.; and Vanzant, E.S. (1992) "Influence of frequency of energy supplementation on utilization of early-summer, tallgrass prairie forage," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 1. <https://doi.org/10.4148/2378-5977.2181>

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Influence of frequency of energy supplementation on utilization of early-summer, tallgrass prairie forage

Abstract

Fifteen ruminally cannulated beef steers were used in a pasture supplementation experiment to determine the effects of frequency of energy supplementation on intake and digestion of tallgrass prairie forage during early to mid-summer. Steers grazed a common pasture and were assigned to the following treatments: no supplement (control); 4 lb rolled sorghum grain/head/day; 9.3 lb grain/head/3 times weekly. Steers in the two supplemented groups consumed the same amount of sorghum grain/head/week. In general, supplementation was not harmful ($P = .17$) to forage intake. However, providing supplement 3 times weekly tended ($P = .11$) to depress forage intake compared with daily supplementation. Although supplementation tended ($P = .07$) to cause selection of less fiber in the diet, total forage digestion tended ($P < .07$) to be depressed by supplementation. However, total diet organic matter digestibility was not significantly altered by treatment, probably because of the impact of the highly digestible supplement. Based on trends in intake and grazed forage selection, achieving optimal benefit from supplementation of cattle grazing relatively high-quality forage appears more likely when its provided daily rather than 3 times weekly.

Keywords

Cattlemen's Day, 1992; Kansas Agricultural Experiment Station contribution; no. 92-407-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 651; Beef; Summer range; Energy supplement; Sorghum grain; Forage intake; Forage digestion

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Authors

J.L. Beaty, R.C. Cochran, B.A. Lintzenich, and E.S. Vanzant

INFLUENCE OF FREQUENCY OF ENERGY SUPPLEMENTATION ON UTILIZATION OF EARLY-SUMMER, TALLGRASS PRAIRIE FORAGE¹

*J. L. Beaty, R. C. Cochran, B. A. Lintzenich,
and E. S. Vanzant*

Summary

Fifteen ruminally cannulated beef steers were used in a pasture supplementation experiment to determine the effects of frequency of energy supplementation on intake and digestion of tallgrass prairie forage during early to mid-summer. Steers grazed a common pasture and were assigned to the following treatments: no supplement (control); 4 lb rolled sorghum grain/head/day; 9.3 lb grain/head/3 times weekly. Steers in the two supplemented groups consumed the same amount of sorghum grain/head/week. In general, supplementation was not harmful ($P = .17$) to forage intake. However, providing supplement 3 times weekly tended ($P = .11$) to depress forage intake compared with daily supplementation. Although supplementation tended ($P = .07$) to cause selection of less fiber in the diet, total forage digestion tended ($P < .07$) to be depressed by supplementation. However, total diet organic matter digestibility was not significantly altered by treatment, probably because of the impact of the highly digestible supplement. Based on trends in intake and grazed forage selection, achieving optimal benefit from supplementation of cattle grazing relatively high-quality forage appears more likely when its provided daily rather than 3 times weekly.

(Key Words: Summer Range, Energy Supplement, Sorghum Grain, Forage Intake, Forage Digestion.)

Introduction

Previous research at KSU reported improved performance of intensive-early stocked steers when supplemented with up to 4 lb/head daily of rolled sorghum grain. In order for early-season supplementation of stockers to be practical on a large scale, it may be necessary to offer supplements less frequently than daily or provide supplement via self-feeders. However, the influence of these methods of supplementation on performance when steers are grazing high quality pasture is not known. Therefore, this experiment was conducted with the objective of evaluating intake and digestion of tallgrass prairie forage during early to mid-summer when steers were supplemented at different frequencies with rolled sorghum grain.

Experimental Procedure

Fifteen ruminally cannulated Angus \times Hereford steers (average initial weight 892 lbs) grazed a single tallgrass prairie pasture from June 13, 1991 through July 17, 1991. Steers were randomly assigned to one of three treatments: no supplement (control); 4 lb rolled sorghum grain/head/day; 9.3 lb grain/head/3 times weekly. Weekly grain intakes in the two supplemented groups were equal. Supplemented steers were gathered at noon to minimize disruption of active grazing periods (e.g., early morning and late evening) and were fed their supplement individually. Control steers were not gathered. Whenever supplement was refused, it was placed in the

¹Appreciation is expressed to Mr. Gary Ritter, Mr. Wayne Adolph, and the student workers at the Range Research Unit for their assistance in conducting this trial.

rumen via the cannula. Generally that occurred with only one steer. All steers had unrestricted access to salt and water throughout the trial.

Steers were adapted to their supplement for 12 days before diet sampling was initiated. Samples of grazed forage were collected via ruminal evacuation during the subsequent 5-day period. Fecal output was measured by total fecal collection during the 7-day period following diet sampling. Indigestible acid detergent fiber content was determined on forage, supplement, and feces in order to calculate forage organic matter and fiber digestion. Estimated digestibility was combined with measured fecal output to determine forage organic matter intake.

Results and Discussion

Although forage intake was largely unaffected ($P = .17$) by supplementation per se, reducing the frequency of supplementation from daily to 3 times weekly depressed forage intake (Table 1). Because forage intakes were not greatly different for supplemented vs. unsupplemented steers, total diet organic matter (OM) intake increased from the addition of the supplementation. In addition, total diet OM intake was greater ($P = .11$) for the steers supplemented daily than the group supplemented 3 times weekly. Fecal output measurements supported those observations.

Neutral detergent fiber content (NDF) in the forage tended to be lower ($P = .07$) for the supplemented groups compared with controls. Within the supplemented groups, content of NDF in the forage also tended to be ($P = .09$) lower with daily supplementation. In spite of slight reductions in fiber concentration in forage selected by supplemented steers, calculated forage digestion tended ($P = .07$) to be lower for supplemented than control steers. No differences were evident in forage digestion between the two supplemented groups. Although slight differences in forage digestion were apparent among the treatment groups, total digestion was similar for all groups, suggesting that the total diet OM digestion in the supplemented steers was improved via the highly digestible supplement.

Although both supplementation treatments tended to slightly depress fiber digestion, supplementing steers daily appeared to have no impact on forage intake and may have slightly decreased the concentration of fiber in the forage selected. In contrast, supplementation 3 times weekly depressed forage intake and tended to result in steers selecting a diet with higher concentration of fiber compared with daily supplementation. It appears that daily supplementation (or possibly self-feeding) would be preferable to less frequent supplementation, when grain is provided to stockers grazing relatively high-quality forage.

Table 1. Effect of Supplementation Frequency on Organic Matter (OM) Intake and Digestion

Item	Supplementation treatment			Contrasts ^a	
	7	3	0	7Xvs3X	SvsNS
Forage OM Intake, % BW	2.0	1.7	2.0	P = .11	P = .17
Total OM Intake ^b , % BW	2.4	2.2	2.0	P = .11	P = .06
Fecal OM Output, % BW	0.81	0.74	0.69	P = .06	P = .02
Ash-free NDF ^c in					
grazed forage (% of OM)	68.3	71.1	72.3	P = .09	P = .07
Forage OM Digestion, %	61.7	61.0	65.8	P = .77	P = .07
Total OM Digestion, %	65.9	65.7	65.8	P = .94	P = .99
Weight Change, lb	44.0	33.6	34.8	P = .31	P = .64

^a7Xvs3X = "Daily" vs "Three" (3-times weekly) supplementation comparison; SvsNS = Supplementation (average of the daily and 3-times weekly groups) vs "Control" (no supplementation) comparison.

^bTotal intake = forage intake plus supplement intake.

^cNDF = Neutral Detergent Fiber.